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MONTANA DEPARTMENT OF FISH AND GAME
ENVIRONMENT AND INFORMATION DIVISION

JOB PROGRESS REPORT
RESEARCH PROJECT STATEMENT

State Montana

Project No. FW-3-R-2

Job No. I-c

Title Fish and Game Planning, Upper Yellowstone-Shields River Drainages - Upland Game Bird Inventory

Period Covered July 1, 1973 to June 30, 1974

ABSTRACT

Vegetation in the area was broadly divided into the following zones: sagebrush-grassland, grassland, conifer, river bottom, aspen, brush and agricultural. Land ownership maps were prepared, and data on land use presented. Work was begun on land use and vegetation maps. Species of upland game birds found in the area include sage grouse, sharp-tailed grouse, blue grouse, ruffed grouse, pheasants, Hungarian partridge, turkey and chukars.

Known sage grouse and sharp-tailed grouse breeding areas were censused. Three sage grouse and one sharp-tailed grouse wintering flocks were located during aerial surveys. An average of 1.5 calls per 2-minute stop was recorded for a pheasant crowing route established along the Shields River. Territorial blue grouse were banded in the Bear Creek drainage in an effort to gain more intensive information on this species. Winter and spring waterfowl surveys are presented. Data from a mountain bluebird nesting study was analyzed and bald eagle and beaver distribution maps prepared.

OBJECTIVES

The purpose of this study is to determine the extent and location of upland game and waterfowl habitat, to obtain information on breeding populations, production and hunter utilization, and to ascertain the distribution and relative abundance of upland game and waterfowl within the Upper Yellowstone and Shields River drainages. In conjunction with these objectives, specific problems affecting upland game and waterfowl are to be delineated and possible solutions to these problems are to be formulated.

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TECHNIQUES

To aid in plotting habitat types and associated wildlife distribution, work maps were reproduced from large scale (1 inch equals 2 miles) U. S. Forest Service maps. All game bird observations were plotted on these maps. Mosaic aerial photographs (1 inch equals 1 mile) were obtained for delineating specific habitat types such as sagebrush-grassland areas. These will be enlarged to the same scale as the above work maps and overlays prepared.

Attempts to locate all sage grouse and sharptail breeding areas have been made by driving roads, looking and listening during the spring. Future attempts at locating the more remote grounds will be made with fixed-wing aircraft. Winter sage grouse concentrations were located mainly from an airplane. Mountain grouse distribution and concentrations were identified by walking through likely looking areas. A pheasant crowing count route has been established to provide a population density index.

Game bird production data were gathered by running predetermined vehicle routes, random observations and by collecting wings from hunter-killed birds.

A checking station previously established at Wilsall was used to gather information on hunting pressure and hunting success in the Shields drainage. Hunter use in the Upper Yellowstone drainage was determined by personal contacts.

VEGETATION

Vegetation in the study area was broadly divided into the following zones: sagebrush-grassland, grassland, conifer, river bottom, brush, aspen and agricultural.

The sagebrush-grassland zone predominates the upper portions of the Shields drainage where it supports a population of sage grouse. Large portions of this zone have either been sprayed with chemicals to kill the sage or plowed up and planted to grain or hay. This zone also occurs in the foothill portions of many mountainous areas where it is used extensively by blue grouse in the spring and summer.

The conifer zone is composed of the Douglas fir, lodgepole pine, spruce-fir and alpine types. Blue grouse occupy some portions of this zone during most of their life cycle.

The grassland zone occurs on the drier portions of the drainages. It also extends onto the dry ridges of the lower portions of the conifer zone. This zone is the least productive where game birds are concerned, although blue grouse may be found there in fairly large numbers during certain times of the year.

The river bottom zone is limited to the moist areas along most river courses. It is dominated by deciduous tree and shrub species such as cottonwood, willow, aspen and alder. Ruffed grouse are centered around this zone, as well as the aspen and brush zones found in the more moist portions of the conifer areas.

The agricultural zone is located mostly in lowland areas where hay is the major crop. A considerable amount of grain is grown on some of the benchland areas of the Shields drainage. Pheasants and Hungarian partridge are most often found in association with this zone.

CLIMATE

Four weather stations exist in the boundaries of the Upper Yellowstone-Shields River project area. The Gardiner station is on the southern border. Two stations are located in the center of the area in the Livingston vicinity, and one station is in the northern section in the Wilsall area.

The average annual temperature of the area for the period 1958-1967 was 44.2 F with an average annual precipitation of 14.67 inches. The average annual temperature and total precipitation for each of the four stations were as follows: Gardiner - 44.2 F, 11.2 inches; Livingston - 46.8 F, 14.1 inches; Livingston FFA - 45.1 F, 13.9 inches; and Wilsall 8 ENE - 40.8 F, 19.4 inches.

A definite north-south gradient was noted in regard to total annual precipitation with Gardiner, the southern station, recording the least and Wilsall, the northern station, recording the greatest annual precipitation. May, June and September were the 3 months that normally received the greatest amount of precipitation, averaging 48.5 percent of the total annual precipitation. The average length of the growing season was 116 frost-free days.

LAND USE AND OWNERSHIP

The major portion of the Upper Yellowstone-Shields River project area lies within Park County with portions of Gallatin, Meagher and Sweetgrass Counties included in the boundary. Table 1 gives a breakdown of land ownership within the study area based on county ownership maps.

Table 1. Land ownership.

Ownership	Acres	Percent
Private	884,220	52
State	34,480	2
Bureau of Land Management	8,940	1
Burlington Northern Railroad	38,780	2
U. S. Forest Service	714,700	43
Total	1,681,120	100

The pattern of land ownership can be seen in Figure 1. A majority of state lands are associated with school sections, and Burlington Northern lands are found in the familiar checker board pattern with U. S. Forest Service lands.

Table 2 presents a breakdown of land use by agricultural and nonagricultural types for Park County.

From tables 1 and 2 it can be seen that 44 percent of the project area and 52.8 percent of Park County are federally owned and primarily national forest. The dominant use of private land in the area is agriculture, and this is primarily related to the raising of livestock with some small grain production. Approximately 60,000 head of cattle are raised in Park County. The acreages of small grain production are as follows: 20,000 acres of wheat, 2,200 acres of oats, 10,000 acres of barley and 25,000 acres of summer fallow.

Concerning the forested portions of Park County, approximately 328,000 acres are presently classified as commercial timber producing land. This includes federal, state and privately owned lands. As of 1969 there were four active sawmills in

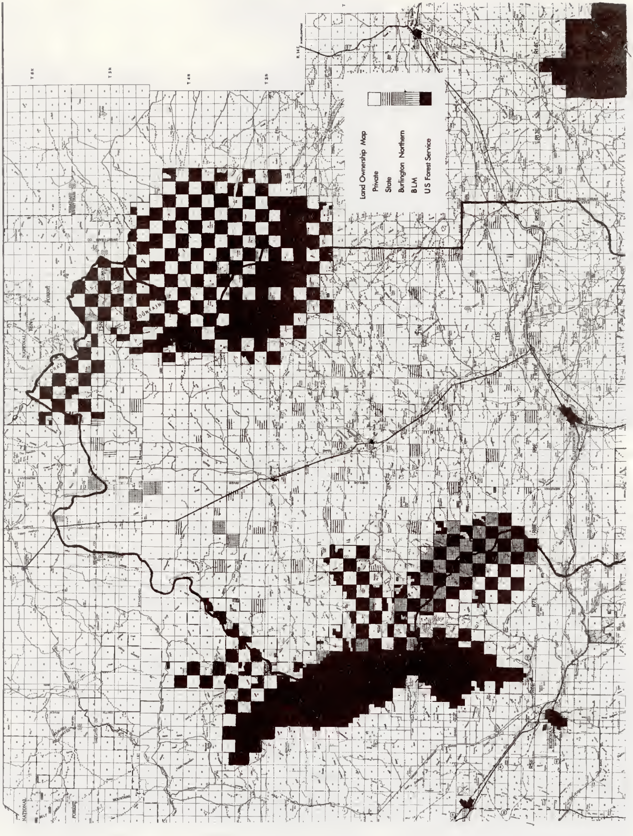

Figure 1. Land ownership map.

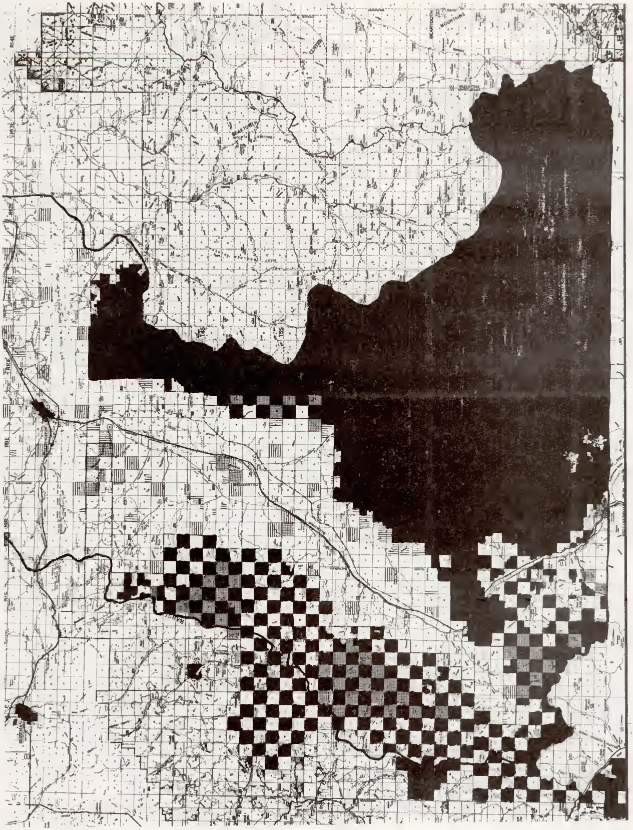

Figure 1. Land ownership map.

Table 2. Land use - Park County

Type	Acres	Percent
Nonagricultural land		
Federal	887,969	52.8
Urban or built up	18,856	1.1
Small water areas	3,652	0.2
Total	910,477	54.1
Agricultural land		
Cropland	125,000	7.4
Pasture	35,000	2.1
Range	457,000	27.2
Forest	147,274	8.8
Other	6,200	0.4
Total	770,803	45.9
Totals	1,681,280	100

Park County capable of an annual capacity of 15-25 MM board feet. Approximately 8-15 MM board feet are annually provided by private lands with the national forest producing the remainder.

The distribution and location of agricultural lands have been mapped from 1955 and 1965 aerial photographs. These maps will be included in the final project report and used in correlation with wildlife distribution maps.

UPLAND GAME BIRDS

Sage Grouse

Eight known sage grouse strutting grounds exist in the area. Two of these were located in 1967 by department personnel and six were located in 1973. No new grounds were located during this report period although searches in adjacent habitat areas were made and will continue next year.

The number of strutting males (Table 3) ranged from 60 on the "Roadsign" ground to zero on the "Wilsall No. 1 and 2" grounds. A general decline in the numbers of strutting males from 1973 was noted on all the grounds except the "North Ringling" which had an increase.

The "Wilsall No. 1 and No. 2" grounds located in 1967 would appear to no longer effectively exist. The loss of these two grounds appears to be the result of sagebrush removal on adjacent habitat areas.

Table 3. 1974 sage grouse strutting ground counts.

Ground	Date	No. of Males	Previous High Count
Clyde Park	3/27	18	32 (1973)
	4/19	21	
	5/ 1	26	
Wilsall No. 1	4/ 2	0	34 (1967)
	4/12	0	6 (1973)
Wilsall No. 2	4/12	0	4 (1967)
	4/19	0	1 (1973)
Stockdam	3/28	10	57 (1973)
	4/ 5	3	
	4/12	26	
	5/ 2	29	
Over-the-hill	3/28	17	85 (1973)
	5/ 8	39	
Roadsign	3/28	28	99 (1973)
	5/ 2	60	
North Ringling	3/28	12	8 (1973)
	4/ 5	11	
	5/ 3	3	
Hogback	3/ 8	1	23 (1973)
	4/ 5	5	
	5/ 3	19	

Due to poor weather conditions, only one aerial survey was made to locate winter sage grouse concentrations. One hundred twenty birds in three flocks were located during this flight. The birds were well dispersed at the time of the flight due to light snow cover and the late date, March 12. The above observations are included in Figure 2 along with the 1973 data.

As of July 1974, brood observations showed an average of 4.7 young per hen with a range in brood size of 3 to 6. Brood observations will continue and be reported on next year. Data from the Wilsall check station in 1972 showed a peak of hatch for sage grouse as June 10-16, with 77 percent of the hatch occurring between June 3 and June 24.

Sage grouse production data for Region 3 is presented in Table 4. In the 7-year period of 1966-1973 an average of 199 juveniles/100 adult hens was recorded from regional wing surveys. 1972 showed above average production resulting from a below average adult segment and a slightly higher juvenile population.

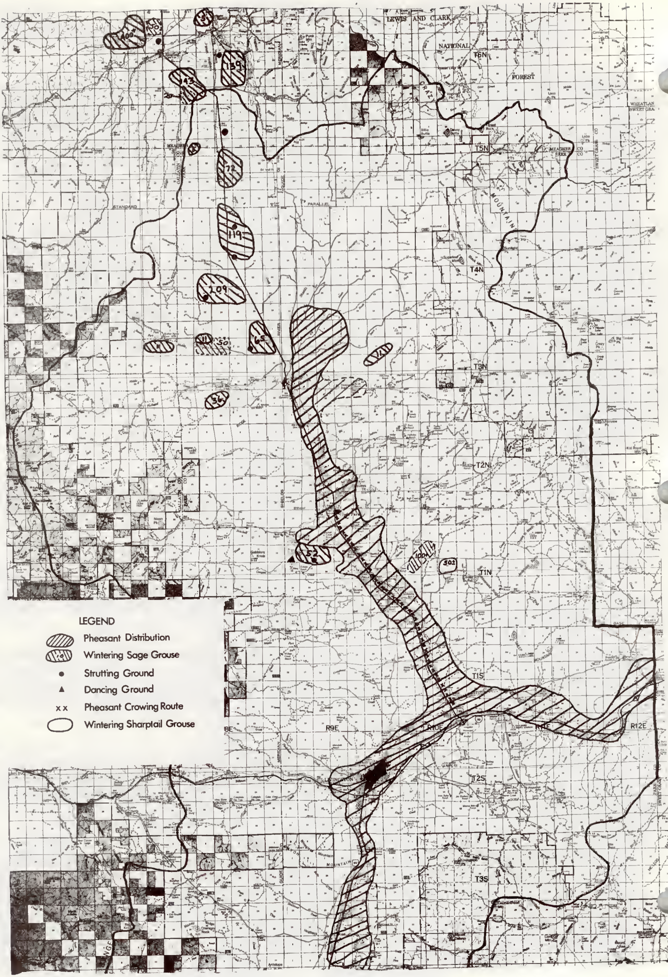

Figure 2. Upland game bird distribution map.

Table 4. Sage grouse production data (Region 3).

Year	Juv.	Yearl.	2+	Uncl. Adults	Total Adults	Total Grouse	Juv./ Adult	Juv./ Hen
1966	186	42	42	68	152	469	1.22	2.22
1967	199	65	38	38	141	598	1.41	1.98
1968	380	59	49	147	255	478	1.49	1.57
1969	389	149	46	159	354	743	1.10	2.37
1970	221	90	94	73	257	478	0.86	1.57
1971	315	92	105	86	283	598	1.11	1.98
1972	289	73	49	58	180	469	1.61	2.22
Average	282.7	81.4	60.4	89.9	231.7	547.6	1.26	1.99

Harvest data presented in Tables 5 and 6 show a relatively constant harvest of sage grouse and number of hunters for the last several years following a decline in the mid-sixties. The reasons for the significant increase in the projected harvest for Park County (Table 6) in 1972 and 1973 are not immediately known. However, it is felt that these figures do not reflect a proportionate increase in the sage grouse population due to deteriorating habitat conditions. In addition, check station data (Table 5) would not confirm this degree of increase in the Park County harvest.

Table 5. Upland game bird harvest - Wilsall check station.

Year	No. Hunters	Total Birds	Sage Grouse	Sharp-tails	Ruffed Grouse	Blue Grouse	Huns	Birds/ Hunter
1963	120	155	117	3	-	11	24	0.9
1965	190	165	119	7	1	9	-	0.9
1966	169	173	114	9	12	16	-	1.0
1967	111	75	57	-	-	11	7	0.7
1968	72	66	53	1	-	6	6	0.9
1969*	75	93	45	2	-	37	9	1.2
	32	52	41	5	-	3	3	1.6
1970*	75	91	77	1	-	12	1	1.2
	26	24	21	-	-	-	3	0.9
1971*	38	55	36	5	-	14	-	1.5
	39	44	29	-	-	13	2	1.4
1972*	76	110	55	10	3	39	3	1.4
	21	19	12	2	-	5	-	0.9
1973	68	82	63	-	-	9	10	1.2

*Years 1969 through 1972 include data from first two days of season.

Table 6. Sage grouse harvest - Park County.

Year	Park County	Region 3
1967	228	4,991
1968	370	4,591
1969	242	8,948
1970	386	5,108
1971	236	3,555
1972	734	6,627
1973	736	6,641

Sage grouse distribution appears to be limited to the Shields drainage and within the drainage primarily in the area north of Wilsall. Two remnant sagebrush areas, one west and the other southeast of Clyde Park, still support sage grouse populations. The primary sage grouse habitat north of Wilsall is continually being eliminated through sagebrush eradication and subsequent conversion to small grain production or pasture. The future of sage grouse would appear to be related to the rate and extent of agricultural expansion in the drainage. Sage grouse sightings in the upper Yellowstone valley from Chico to Carbella have been reported, but these have not been confirmed.

Sharp-tailed Grouse

Sharptail distribution in the project area is limited to the Shields River drainage where they are found in the benchlands to the east and west of the river. This species would not appear to be very abundant in the area, although check station data (Table 5) would indicate they may be increasing in numbers following a decline in the mid-sixties.

The locations of a dancing ground and wintering flock are shown in Figure 2. This dancing ground had a high count of 14 males in 1973 and 17 males in 1974. Due to lack of sufficient snow cover and poor flying conditions, aerial reconnaissance for dancing grounds was impractical in 1974. Ground surveys were also unsuccessful in locating any new grounds. However, with proper conditions, this coming spring additional grounds should be located.

Due to the association of wintering sharptails with cottonwood and willow drainage bottoms, agricultural practices that involve clearing brush from these areas appear to be highly detrimental to this species.

Blue Grouse

The blue grouse is the major upland game bird in the area. They appear to be fairly abundant and are found in nearly all the coniferous regions of the study area. As in other mountainous regions, they migrate in the spring to lower foothill areas for breeding purposes and then back up to the higher ridges and more dense forests in fall and winter.

Breeding blue grouse have been located in all the mountain ranges in the study area. Table 7 presents a list of territorial blue grouse locations from 1973.

Table 7. Male blue grouse territory locations - spring 1973.

Drainage	Location	No. of Males
Fleshman Creek	Sec. 26, T1S, R8E	2
Billman Creek	Sec. 19, T2S, R8E	1
Pole Gulch	Sec. 19, T5S, R8E	3
"	Sec. 24, T5S, R7E	6
"	Sec. 25, T5S, R7E	5
Big Creek	Sec. 13, T6S, R6E	3
Slip and Slide Creek	Sec. 36, T7S, R7E	-
"	Sec. 1, T8S, R7E	8
"	Sec. 6, T8S, R8E	-
Above Cutler Lake	Sec. 10, 11, T8S, R7E	5
Bear Creek	Sec. 16, T9S, R9E	8
Emigrant Creek	Sec. 14, 23, T6S, R8E	6
Mill Creek	Sec. 19, 33, T6S, R10E	3
Mission Creek	Sec. 28, T2S, R11E	1
Porcupine Creek	Sec. 10, T4N, R10E	2

These males were all located between April 26 and May 23 by walking into likely looking areas. Numberous female grouse were also found in the same areas.

As part of an effort to gain more intensive information on this species, an area in the Bear Creek drainage north of Gardiner was selected as a banding site. Territorial male and female grouse were observed and banded in this area during the spring of 1974. The area is typical of other blue grouse breeding areas that have been identified in the state. It is characterized by south and southwest slopes between 6,400 and 8,000 feet and thickets of timber, primarily Douglas fir, which have resulted from past selective logging.

The major portion of the banding area is located in the northern half of Sec. 16, T9S, R9E (Figure 3).

During 4 days of intensive searches, 36 territorial males and 13 females were observed. Of these, 7 males and 1 female were caught and individually marked with colored and numbered leg bands. Observations of these birds will continue in the coming year, and additional banding and habitat measurements will be made.

The peak of hatch for blue grouse in Region 3 has centered around the third or fourth weeks of June with a majority of the hatch coming off between the third week of June and the first week of July (Table 8).

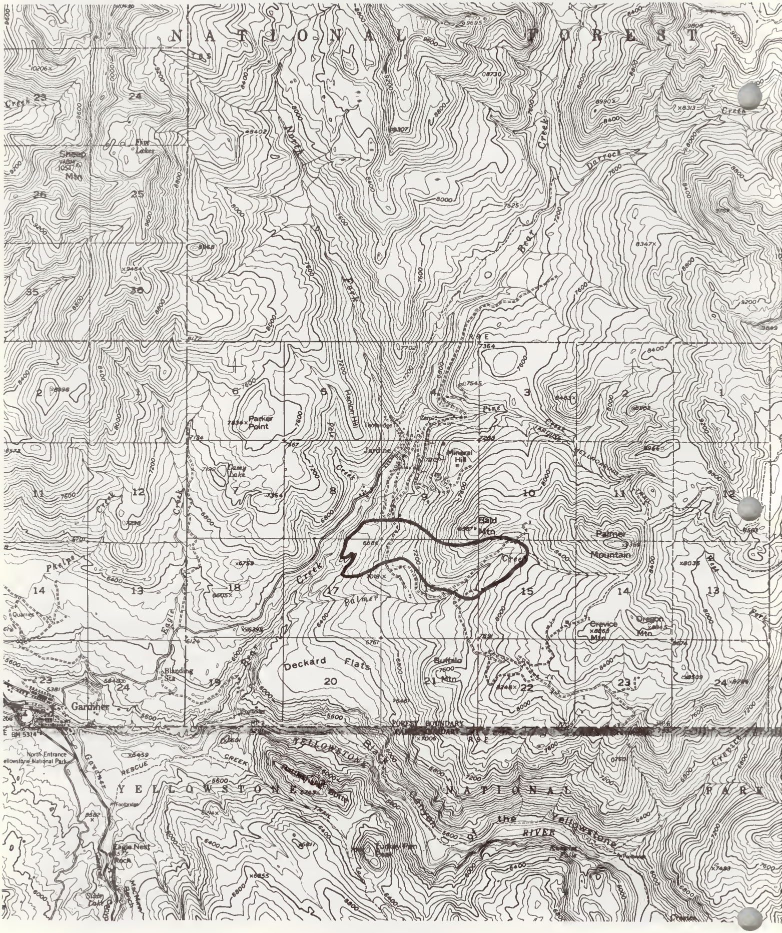

Figure 3. Blue grouse banding area.

Table 8. Blue grouse hatching chronology - Region 3.

Year	Peak of Hatch	Remarks
1957	June 16 - 23	78 percent hatch between June 9-30
1958	June 13 - 20	95 " " " June 5-28
1959	June 21 - 28	92 " " " June 13 - July 5
1960	June 26 - July 2	86 " " " June 19 - July 9
1961	June 25 - July 1	76 " " " June 18 - July 8
1962	June 21 - 27	85 " " " June 13 - July 4
1963	June 27 - July 3	92 " " " June 13 - July 3
1964	June 25 - July 1	86 " " " June 18 - July 8
1967	June 25 - July 1	73 " " " June 18 - July 2
1972	June 24 - 30	74 " " " June 17 - 30

Table 9 presents the blue grouse production data for Region 3 for the period of 1966 to 1972. Average production during this time was 4.63 juveniles per adult female. 1972 data indicate above average production with a ratio of 5.61 juveniles per adult female being the highest recorded during the period. A sample of 56 wings collected during the 1972 hunting season was composed of 44 juveniles and 12 adults for a ratio of 3.7 juveniles per adult or 7.3 juveniles per adult female.

Table 9. Blue grouse production data - Region 3.

Year	Juv.	Yearl.	2+	Uncl. Adults	Total Adults	Total Grouse	Juv./ Adult	Juv./ Adult Female
1966	126	10	18	35	63	189	2.00	5.04
1967	161	21	30	13	64	225	2.52	4.74
1968	249	56	46	53	155	404	1.61	4.37
1969	94	31	36	51	118	212	0.80	-
1970	109	15	26	22	63	172	1.73	3.63
1971	132	31	8	18	57	189	2.32	4.40
1972	202	33	23	49	105	307	1.92	5.61
Average	153.3	28.1	26.7	34.4	89.3	218.1	1.84	4.63

Harvest data (Tables 5 and 10) indicate a fairly consistent harvest of blue grouse for the study area with the size of the annual harvest apparently depending on the reproductive success of the year. The increase in the 1972 and 1973 harvest over the previous three years was probably due to two years of high productivity, though a general population increase may be occurring.

Table 10. Blue grouse harvest.

Year	Park County	Region 3
1967	1100	9,186
1968	1863	10,428
1969	846	8,666
1970	941	7,762
1971	812	5,661
1972	1173	16,089
1973	1216	15,815
Average	1135.9	10,515.3

Ruffed Grouse

Ruffed grouse are not very abundant in the study area, but they are found in huntable numbers throughout the area where suitable habitat exists. They are primarily limited to the aspen-parks and deciduous drainage bottoms in the Crazy, Bridger, Gallatin and Absaroka Mountain ranges. In addition, they are found in the brushy areas along the main Shields River and in cottonwood-willow bottoms and islands along the Yellowstone River. These birds were apparently once fairly abundant along the major river bottoms; however, increased brush removal and heavy livestock use of these areas has undoubtedly had a very detrimental effect on them.

Efforts to establish a ruffed grouse drumming route along the upper Shields River have been unsuccessful, apparently due to the low population density. However, random attempts to locate breeding males in suitable habitat areas will continue.

Check station data (Table 5) indicate that these birds may have been fairly abundant in the mid-sixties with a subsequent decline. 1972 was the first year since 1966 that they were recorded at the check station in Wilsall.

Franklin Grouse

This species has been reported in the area, and a harvest as high as 271 birds reported for Park County. None of these reports have been confirmed, and the existence of this species is doubtful. The harvest figures are felt to be the result of hunter misidentification on questionnaires and subsequent expansion through statistical analysis.

Pheasant

Pheasant distribution presently includes the Yellowstone River bottomlands from Pine Creek to Springdale and the brushy bottoms of the Shields River from its mouth north to Wilsall and up several tributaries of the Shields in the Wilsall area (Figure 2). The highest population density and best pheasant habitat is along the Shields River from Clyde Park to its mouth and then down the Yellowstone River to

Springdale. The population trend for pheasants has apparently been downward for a number of years and will probably continue as agricultural use of these bottomlands intensifies and expands.

A pheasant crowing route established along the Shields River from the Yellowstone River bridge to Clyde Park, a distance of 13 miles, showed an average of 1.5 calls per 2-minute stop in both 1973 and 1974. This is indicative of the low pheasant population in the area. In 1973 the vegetation composition along the route was recorded as follows: cottonwood river bottom - 4 percent, bottomland brush - 26 percent, hay pasture - 52 percent, upland pasture - 11 percent, plowed fields - 3 percent and miscellaneous (including grain, gravel pits and home sites) - 2 percent. The notable lack of small grain agriculture and the continuing practice of brush removal would appear to be the two factors limiting the pheasant population in this area.

Between the years of 1930 and 1971, 14,703 game farm pheasants were released in Park County, for an average of 360 birds per year. Although this is a popular management practice, its biological shortcomings are well known and any possible continuation of this program should be seriously evaluated.

Hungarian Partridge

This species is found throughout the nonforested portions of the study area from the Yellowstone Park boundary to the sagebrush-grasslands north of Wilsall. They are locally abundant on the agricultural benchlands east and west of the Shields River and the agricultural areas south of Livingston along the Yellowstone River. This is one species that may benefit by the expansion of small grain agriculture in the benchlands and the sagebrush-grasslands of the Shields drainage.

Hungarian partridge may have been considerably more abundant in the mid-sixties than today, as indicated by check station data (Table 5). The reason for this apparent decline is not immediately obvious, but may involve land use practices, weather, or inherent biological factors in the species itself.

Chukar Partridge

The distribution of this species is presently limited to the vicinity of Antelope Butte south of Livingston where they have become established through releases by private individuals. There appears to be potentially good habitat for chukars in this immediate area. In 1972 these birds may have successfully reproduced. A pair was observed in May 1974 adjacent to the brushy bottom of the Trail Creek drainage several miles west of Antelope Butte. This would appear to indicate that these birds are attempting to expand their range, but it is doubtful that they can survive the relatively severe winter conditions of this area.

The place nearest to the study area where chukars have been released by the Montana Department of Fish and Game was a ranch 12 miles north of Big Timber where 150 were released in 1956.

Merriam's Turkey

Turkeys have been released on the Miles Ranch about 8 miles west of Livingston on Billman Creek. The original plant of 20 birds was made in 1968 followed by an additional release of 14 birds in 1972. Seventeen turkeys were observed wintering on the Miles Ranch in 1973. This number increased to 22 birds in 1974. These birds spend most of the winter in this immediate vicinity and feed on unbaled stacks of a barley-hay mixture. These birds disperse to the north and south of the Miles Ranch during the rest of the year, with observations being made by fall deer hunters in the surrounding area. In addition, breeding males were observed in the spring of 1974 in openings along the Trail, Miner and Billman Creek divides.

A group of turkeys has also been reported wintering on the Christiansen Ranch on Mission Creek. Other reports of turkey sightings come from Dry, Pine and Fairy Creeks. A private release of turkeys has also been reported on the Sheep Mountain Ranch on the south end of the Crazy Mountains. This plant has apparently fluctuated between 75 and 200 and winters on the ranch site. The size and present status of this plant will be confirmed this coming winter.

It would appear that the original state plants have dispersed somewhat, and an effort will be made this winter to confirm reported sightings and determine the extent of this dispersal. It is doubtful if this species will ever become abundant with deep snow and lack of food in wintering areas being the limiting factor. Their apparent dependence on agricultural products for a winter food supply would possibly confirm this.

WATERFOWL

Since the study area is situated on the eastern edge of the Pacific flyway, it does not receive as great a degree of use by migratory waterfowl as other areas of the state. However, late fall concentrations on the Yellowstone River do provide good hunting opportunities for both river and field shooting.

Waterfowl production is limited to the Yellowstone and Shields Rivers and reservoirs and stockponds in the Shields drainage. Among the species that nest in the area are Canada geese, mallards, pintails, gadwall, baldpates, blue-winted teal, common mergansers, shovelers, lesser scaup, and possibly canvasbacks and redheads. In addition, a resident flock of mute swans breeds and winters on a spring creek about 5 miles south of Livingston.

Species of waterfowl found wintering along the Yellowstone River include mallards, common mergansers, common goldeneyes, Barrow's goldeneyes, pintails, gadwalls, baldpates, lesser scaup, buffleheads, ring-necked duck, and Canada geese. Table 11 presents data on midwinter waterfowl use of the Yellowstone River.

Table 11. Aerial survey, Yellowstone River - Gardiner-Big Timber (1/9/74)

Species	Number
Mallards	1106
Goldeneyes	1436
Common mergansers	203
Canada geese	65
Mute swans	25

Breeding ground aerial surveys (Table 12) in 1967, 1973 and 1974 indicate a possible increase in Canada geese from 1967. However, variations in the counts between 1967 and the last 2 years may be due to differences in the time and conditions under which they were flown.

Table 12. Canada geese breeding ground surveys - Yellowstone and Shields Rivers.

Area	Date	Pairs	Singles	Groups	Total
Yellowstone R.					
Gardiner-	1967	0	1	3	4
Livingston	4/11/73	5	1	24	35
	4/20/74	5	6	9	25
Livingston-	1967	13	16	0	42
Big Timber	4/11/73	21	4	36	82
	4/20/74	9	7	58	83
Shields R.					
Wilsall-	4/11/73*	2	1	0	5
Mouth	4/20/74*	0	2	11	13

* Several pairs known to be missed.

Most of the irrigation reservoirs and stockponds in the Shields drainage receive use by migratory or nesting waterfowl in the spring and summer. Late summer and fall use of these water areas is restricted to the larger reservoirs due to drawdown and dewatering.

Table 13 presents the chronology of waterfowl use of Cottonwood Reservoir north of Wilsall during the spring of 1974. Ten Canada geese in two broods were raised on this reservoir in 1974. Also, beginning in July, a flock of 18 white pelicans began using the reservoir for the rest of the summer.

Table 13. Waterfowl use - Cottonwood Reservoir, 1974.

Species	3/27/74	4/2/74	4/5/74	5/23/74
Canada geese	9	-	11	-
Whistling swans	72	72	-	-
Mallards	40	25	250	5
Pintails	500	180	600	8
Common goldeneyes	3	-	25	-
Baldpates	4	15	150	12
Lesser scaup	4	5	40	5
Canvasback	-	-	35	2
Shovelers	-	-	30	3
Common merganser	-	-	10	-
Gadwall	-	-	-	4
Redhead	-	-	-	2
Coot	-	-	-	225
Grebes	-	-	-	28

NONGAME SPECIES

A total of 171 species of birds has been reported for Park County. This is not considered to be a complete list and contacts with local bird watchers and field observations should expand the list which will be included in the final report.

Raptors

Sixteen species of predatory birds have been reported for the study area. The more commonly observed species include bald eagles, golden eagles, red-tailed hawks, marsh hawks, rough-legged hawks, sparrow hawks, goshawk, prairie falcon, great horned owl and short-eared owl.

Random observations of raptors have been made throughout the study area. Eight adult bald eagles were observed during an aerial survey of January 9, 1974 on the section of the Yellowstone River from Yankee Jim Canyon to Big Timber. Additional ground observations would indicate this is a minimum figure for the wintering bald eagle population on this section of the river. The distribution of wintering bald eagles along the Yellowstone River is shown in Figure 4. There would appear to be a relationship between the distribution of bald eagles and islands where they are frequently observed perching on the larger cottonwood trees over the river.

As part of a graduate research program of Montana State University, a survey of golden eagle nests was conducted in the Gallatin and Absaroka Mountain ranges surrounding the upper Yellowstone valley. Relevant data from this research project will be incorporated into the inventory section of this report as it becomes available.

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639.9
FW-3-R-8
I-B and I-C upland Game Birds, Big Game

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MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS
ECOLOGICAL SERVICES DIVISION

JOB PROGRESS REPORT

State: Montana

Title: Middle Missouri River Project

Project No.: Fw-3-R-8

Job No.: I-b and I-c - Upland Game Birds, Big Game

Period Covered: July 1, 1979 through June 30, 1980

ABSTRACT

Data are presented on the location, physiography, climate, soils, vegetation and land use of the new study area.

Data have been collected on big game, upland game birds, waterfowl and beaver *(Castor canadensis)*. Big game present in the study area include mule deer *(Odocoileus hemionus)*, white-tailed deer *(Odocoileus virginianus)*, antelope *(Antilocapra americana)*, elk *(Cervus canadensis)*, and bighorn sheep *(Ovis canadensis)*. Upland game birds present include sage grouse *(Centrocercus urophasianus)*, sharp-tailed grouse *(Pediocetes phasianellus)*, Hungarian partridge *(Perdix perdix)* and ring-necked pheasants *(Phasianus colchicus)*.

Emphasis was placed upon determining distribution, production and winter ranges of big game and distribution, production and location of unknown breeding grounds of upland game birds. Extensive data were collected during Canada goose *(Branta canadensis)* spring nest and production surveys on the Missouri River.

OBJECTIVES

The objectives of the project are to determine the extent and location of wildlife habitat, to ascertain the status, distribution, composition and critical use areas (such as winter ranges) of the wildlife present and to obtain information on breeding populations, productivity and hunter utilization. In conjunction with these objectives, specific problems affecting wildlife are to be delineated and possible solutions to these problems are to be formulated.

TECHNIQUES

Wildlife observations were made from the ground by vehicle and afoot, from the air by fixed-wing aircraft or helicopter and on the rivers by floating in a canoe. Binoculars and spotting scope were used as an aid for wildlife observations and classifications.

Sage grouse and sharp-tailed grouse breeding grounds were located in the spring by systematically traversing the study area and looking and listening for birds and by flying with a fixed-wing airplane over potential breeding ground sites. To determine pheasant densities, a 16-mile long pheasant crowing count route with 16 stops, each 1 mile apart, was set up. The observer stops at each stop, records the number of pheasant crows heard during a 2-minute period and then moves on to the next stop as quickly as possible and repeats the procedure. Game bird production data were gathered by random observations of broods along routes. Spring Canada goose breeding population surveys were made by using fixed-wing airplanes and by floating the Missouri River in a canoe. Canada goose nests were located by stopping at each island and searching the island on foot for nests.

Study Area Description

Location

The study area is located in central Montana (Figure 1). It is composed of several separate segments which will be designated as the Little Rocky Mountains segment, the middle segment, southern segment and the upper Missouri River segment.

The Little Rocky Mountains segment is located 75 miles northeast of Lewistown, Montana. It is approximately 50 square miles of mountains bordered on three sides by the Fort Belknap Indian Reservation (Figure 2). The middle segment is located about 10 miles north of Lewistown (Figure 3). Its southern boundary is U.S. Highway 191 and State Highway 81. The eastern boundary is U.S. Highway 191. The northern boundary follows the Knox Ridge road from the Robinson Bridge, at the Missouri River, in a westerly direction to Winifred, Montana. The boundary then continues in a westerly direction to Arrow Creek. The western boundary then follows Arrow Creek upstream in a southwesterly direction to its junction with State Highway 81. The southern segment is about 15 miles west southwest of Lewistown (Figure 4). Its eastern boundary is U.S. Highway 191. The northern boundary is U.S. Highway 87. The western boundary starts at Raynesford, Montana and follows Little Otter Creek upstream in a southerly direction to its junction with the Lewis and Clark National Forest boundary. The southern boundary follows the national forest boundary. The upper Missouri River segment consists of the Missouri River bottom from Great Falls, Montana upstream to Holter Dam (Figure 5).

The study area includes parts of Phillips, Fergus, Judith Basin, Cascade and Lewis and Clark counties. The only towns of any size in or near the study area are Lewistown, Denton, Winifred, Stanford, Hobson, Geyser, Cascade and Great Falls, a city of over 60,000 population.

Physiography and Climate

The study area includes mountains, plains and river breaks topography. The Little Rocky Mountains are an instrusion of igneous rock forming an isolated island-like mountain mass in the plains. Altitudes range from a base of 4000 feet to a high of 5700 feet. Steep slopes are common in the mountains and streams radiate in all directions from the mountain mass. The high plains

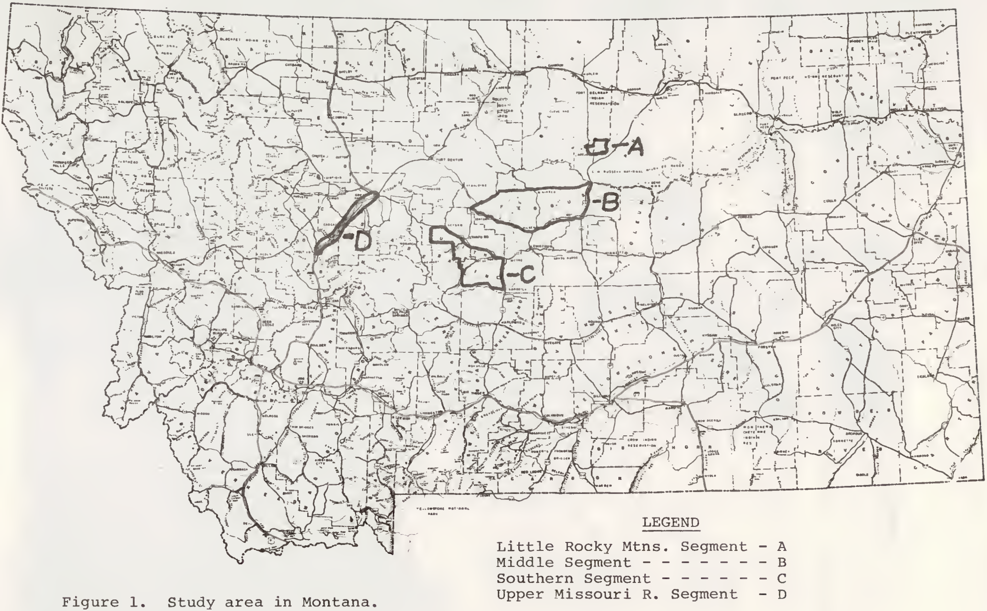
A
B
C
D
LEGEND
Little Rocky Mtns. Segment - A
Middle Segment - - - - - - - - B
Southern Segment - - - - - - C
Upper Missouri R. Segment - D

Figure 1. Study area in Montana.

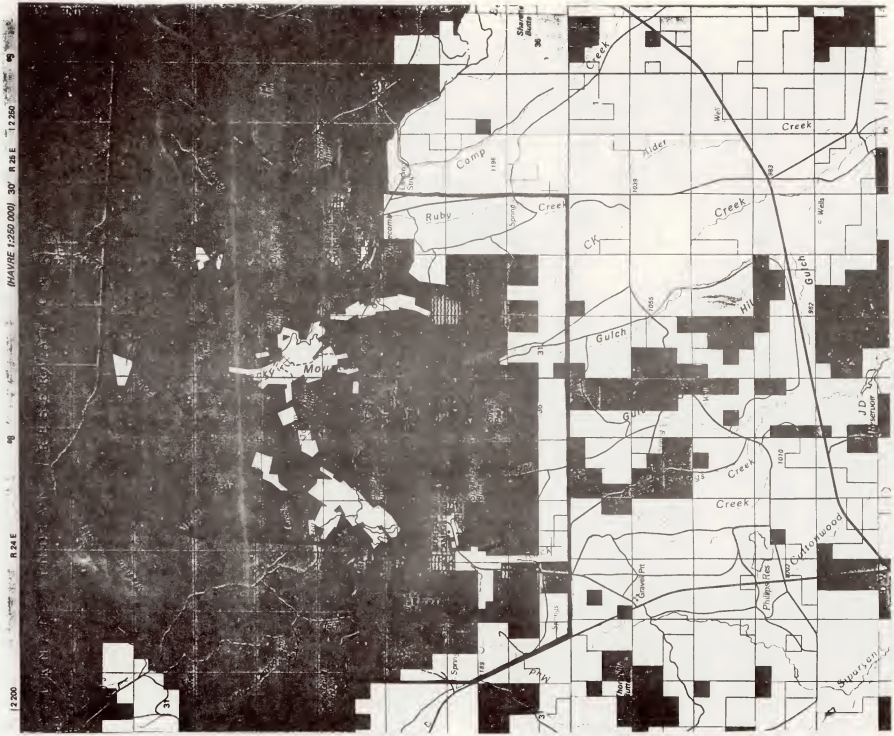

Figure 2. Little Rocky Mountains segment of study area.

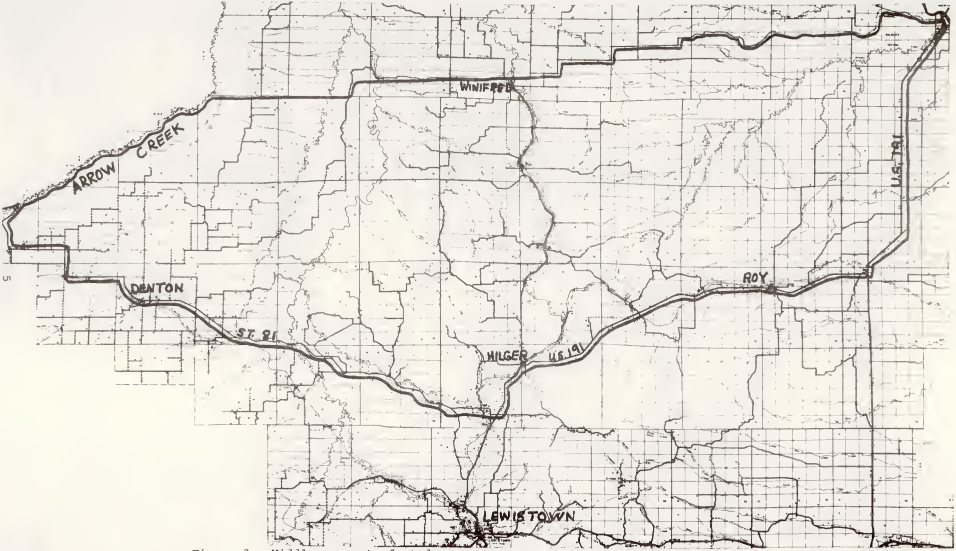

Figure 3. Middle segment of study area.

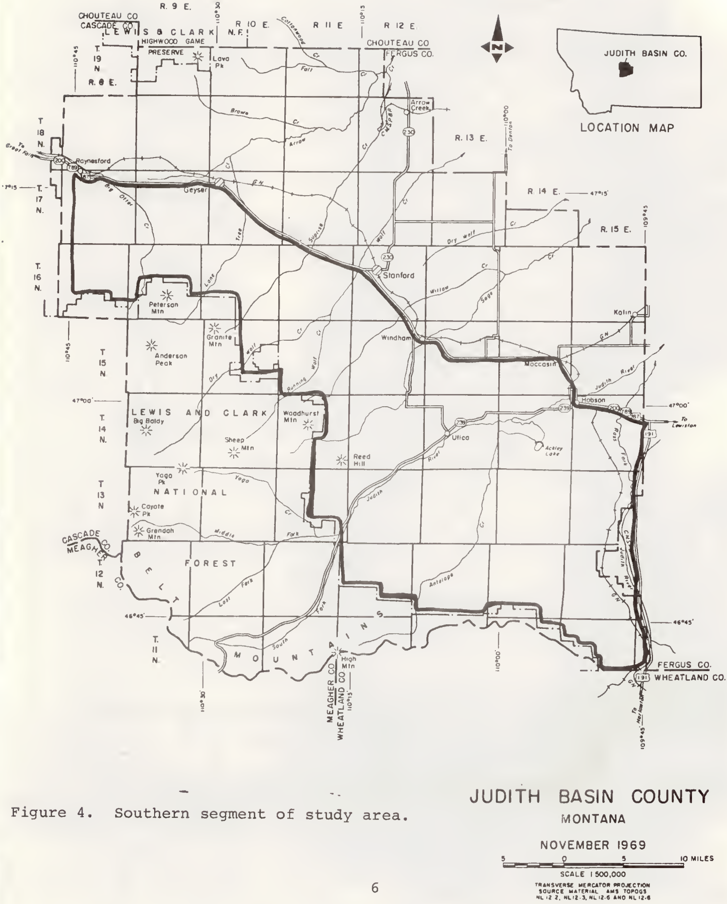

Figure 4. Southern segment of study area.

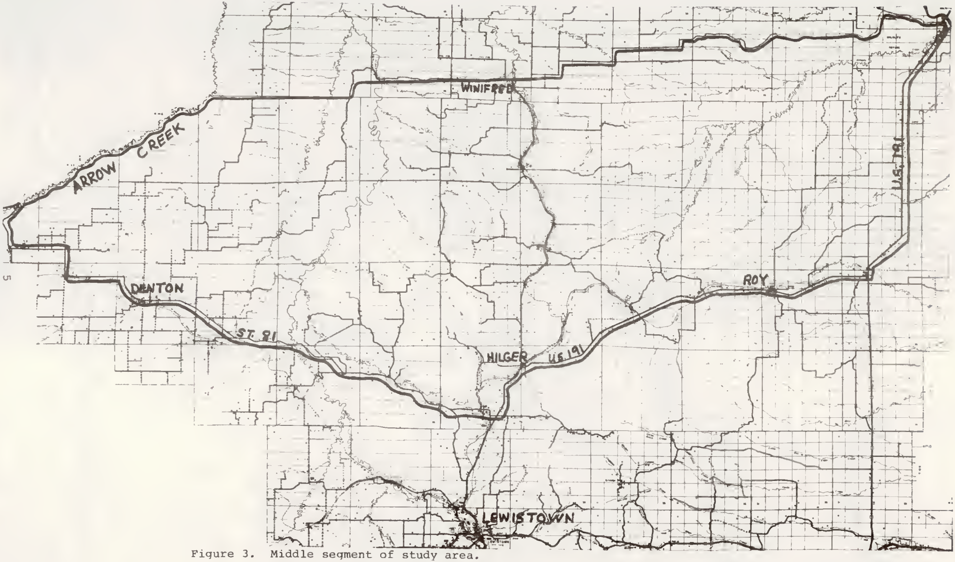

Figure 3. Middle segment of study area.

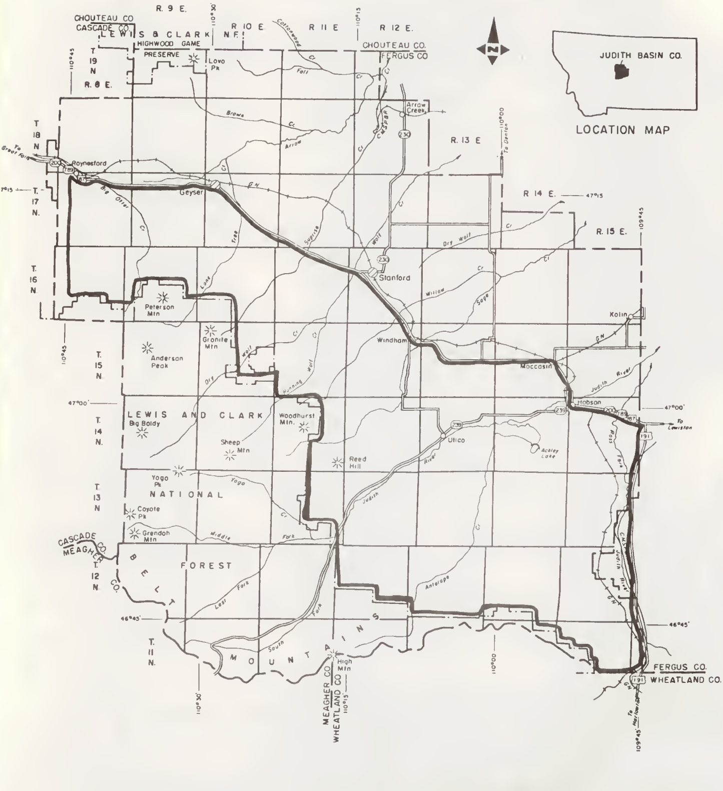

Figure 4. Southern segment of study area.

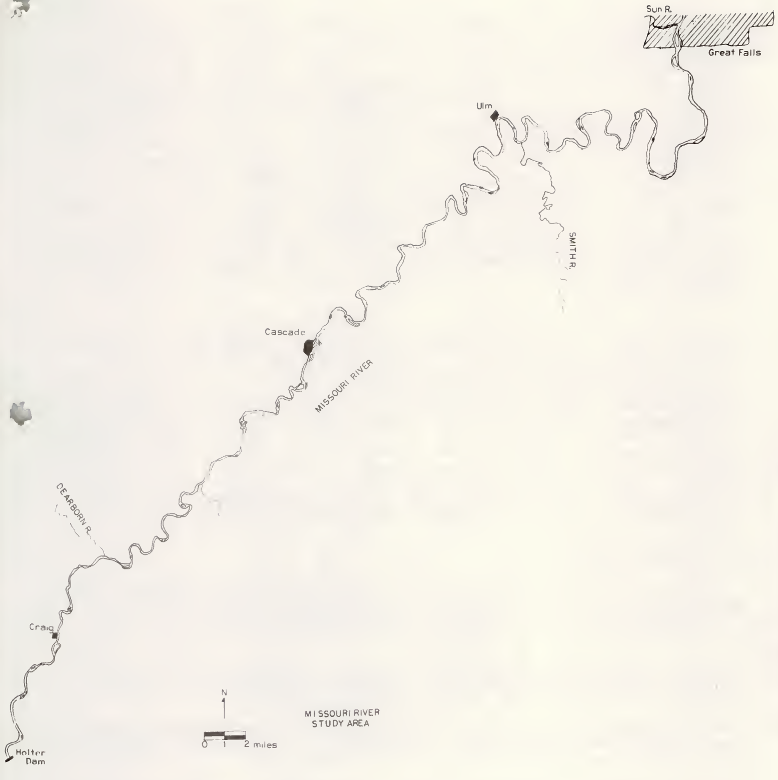

Figure 5. Missouri River segment study area (Holter Dam to Great Falls).

areas of the middle and southern segments of the study area, in contrast to the mountains, are lower in altitude with land surface slopes on the order of a few tens or hundreds of feet per mile. These high plains range from 3000-5000 feet in altitude and they are cut by gentle, steep-walled, low-gradient intermittent to perennial streams. The river breaks topography is confined to the northern half of the middle segment. The streams and the Judith River are all tributaries of the Missouri River and they are steep-walled and have fairly steep gradients and the upland areas are gradually being removed by headward erosion of the small intermittent tributaries to the main streams. The land becomes more intricately dissected as it nears the Missouri River. These river breaks range in elevation from 2260 to about 3000 feet (USDI 1979). The Missouri River segment consists of a riverbottom that starts in the mountains and then enters the high plains near Cascade. This segment starts at about 3500 feet in elevation and drops to about 2800 feet at Great Falls. The riverbottom doesn't meander much while it is confined to the mountains; however, after leaving the mountains the river meanders more and the river gradient decreases.

The climate of the study area is semiarid continental. It is marked by cold winters, warm to rarely hot summers, 10 to 22 inches of precipitation annually, winds primarily from the west and abundant sunshine (USDI 1979). Average annual precipitation ranges from 16 to 22 inches in the Little Rocky Mountains to 14 inches - 18 inches in the southern and middle segment. Rainfall is concentrated in the period from April through June and precipitation from July through September is characterized by localized intense thunderstorms. Snow generally falls between November and April and may be several feet deep in the mountains; on the plains, snow more than 12 inches deep is uncommon but not rare. Winter temperatures may be as low as -40 F for short periods, but the average January mean monthly temperatures are around 15 F. Summer temperatures as high as 110 F have been recorded, but the mean July temperature is about 70 F.

Soils and Vegetation

Ross and Hunter (1976) described the soils and vegetation of the study area. Their map Climax vegetation of Montana is presented in Figure 6. The following is a description of the soils associated with the climax plant communities (range sites) delineated in Figure 6:

1. Silty Range Site (nos. 27 and 38) - Soils more than 20 inches deep of very fine sandy loam, loam, or silt loam. This includes soils with 2 inches or more loam or silt loam over clayey subsoils.

2. Silty - Clayed Range Site (no. 41) - Silty soils are similar to those found in Silty Range Site. Clayed soils are granular clay loam, silty clay loam, silty clay, sandy clay or clay more than 20 inches deep.

3. Clayey - Shallow Clayey Range Site (nos. 31, 32 and 43) - Clayed soils are similar to clayed soils described in Silty-Clayed Range Site above. Shallow clayey soils are shallow granular clay soils that are 10 - 20 inches deep to underlying shale or nearly impervious clays.

4. Riverbreaks Range Site (no. 35) - Mixed soils of various depths and textures on steep irregular slopes. Trees may occur in association

LEGEND

Climax Plant Communities

Silty Range Sites (27, 38)
Silty-Clayey Range Sites (41)
Clayey-Shallow Clayey Range Sites (31, 32, 43)
Riverbreaks Range Site (35)
Douglas Fir and Ponderosa Pine Range Site (51)
Sands and Sandy Range Site (12)

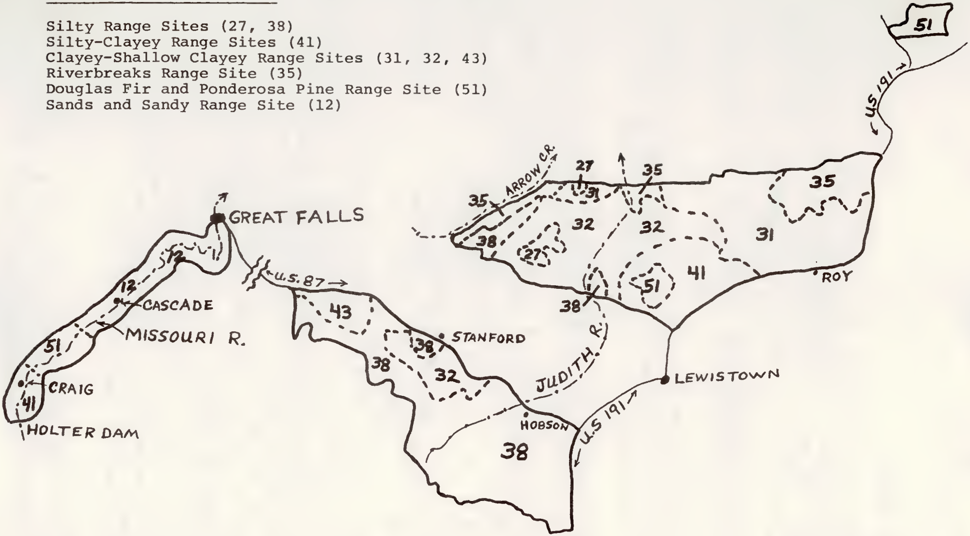

Figure 6. Vegetation and soils map of study area.

with shale outcroppings.

5. Douglas Fir and Ponderosa Pine Range Site (no. 51) - Deep soils that have a cryic temperature regime and brown or light brownish gray surfaces on north aspects and a frigid temperature regime and grayish brown or light brownish gray surfaces on east, south and west aspects. Terrain is steep to very steep mountains slopes. Parent materials are generally colluvium from igneous intrusive or limestone sources.

6. Sands and Sandy Range Site (no. 12) - Sand soils are sands and loamy sands more than 20 inches deep. Sandy soils are coarse to fine sandy loams more than 20 inches deep.

The distribution of existing vegetation types is similar to the climax distribution at the map scale used in this analysis. Six climax plant communities (range sites) are found in the study area and the following is a description of the vegetation of these sites:

1. Silty Range site - Nos. 27 and 38.
No. 27 - Rolling plains landform, 10-14 inches precipitation zone. This site occurs on undulating to rolling uplands, low terraces, fans and flood plains. Dominants in the climax vegetation are bluebunch wheatgrass, western and thickspike wheatgrass, needle and thread, green needle grass, basin wildrye, threadleaf sedge, prairie junegrass, native legumes, big and silver sagebrush, skunkbush sumac, common chokecherry and blue grama (species listed in order of dominance).

2. Silty - Clayey range site - No. 41
No. 41 - High plains landform, 15-19 inches P.Z. Dominants are same as site No. 38 above.

3. Clayey - Shallow Clayey range site - Nos. 31, 32 and 43
No. 31 - Rolling plains landform, 10-14 inches P.Z. This site occurs on rolling uplands, low terraces, fans, floodplains or strongly dissected uplands. Dominants are western and thickspike wheatgrasses, bluebunch wheatgrass, green needle grass, big sagebrush, prairie junegrass, plains reedgrass, prairie sandreed and milkvetches.
No. 32 - Rolling plains landform, 15-19 inches P.Z. This site occurs in the uplands on slopes from nearly level to moderately steep. Dominants are bluebunch wheatgrass, columbia and green needlegrass, idaho fescue, basin wildrye, big sagebrush, western and thickspike wheatgrasses, prairie junegrass, prairie sandreed, lupine and other native legumes, sticky geranium and prairie smoke.
No. 43 - High plains landform, 15-19 inches P.Z. Dominants are rough fescue, bluebunch wheatgrass, columbia needle grass, western and thickspike wheatgrasses, idaho fescue, basin wildrye, lupine, sticky geranium, arrowleaf balsamroot, big sagebrush, prairie smoke, prairie junegrass and death camas.

4. Riverbreaks range site - No. 35
No. 35 - Riverbreaks landform, 10-14 inches P.Z. This site is a composite of a variety of soils, topography and vegetation types. Dominants are ponderosa pine, rocky mountain juniper, Douglas fir (north slopes), bluebunch wheatgrass, western and thickspike wheat-

grasses, green needle grass, prairie sandreed, basin wildrye, needle and thread, greasewood, big sagebrush, creeping juniper, native legumes and prairie junegrass.

5. Douglas Fir and Ponderosa Pine range site - No. 51
No. 51 - Mountain landform, 16-22 inches P.Z. Ponderosa pine climax forests occur on strongly sloping to very steep south and west facing slopes at elevations of 4,000-6,000 feet and east aspects to about 5,000 feet. Douglas fir forests occur above the ponderosa pine forests on east, west, and south aspects and on steep to very steep north facing slopes from about 4,000-7,000 feet. Typical overstory composition is Douglas-fir, 60 percent and ponderosa pine, 40 percent. Dominants are Douglas fir, ponderosa pine, rocky mountain juniper, pinegrass, bluebunch wheatgrass, common snowberry, idaho fescue, white spirea, elk sedge, mallow ninebark, Oregon grape, heartleaf arnica, columbia needlegrass, bearded wheatgrass, mountain brome, richardson needlegrass, twinflower, kinnikinnick, woods rose, utah honeysuckle, common juniper and lupine. In this forest complex, with a loss of the climax forest overstory, ponderosa pine can occupy the Douglas-fir climax forest sites on frigid soils. Lodgepole pine frequently occupies the Douglas-fir sites on soils with a cryic temperature regime. Rocky Mountain juniper may increase on ponderosa pine climax forest sites.

6. Sands and Sandy range site - No. 12
No. 12 - Rolling plains landform, 10-14 inches P.Z. Dominants are:

Sands: Prairie sandreed, needle and thread, Indian ricegrass, threadleaf sedge, native legumes, yucca, and skunkbush sumac.

Sandy: needle and thread, prairie sandreed, threadleaf sedge, bluebunch wheatgrass, western and thickspike wheatgrasses, native legumes, skunkbush sumac and blue grama.

Land Use

The Little Rocky Mountains remained primarily an Indian hunting ground with only a few white men trapping and a few others attempting to raise cattle until the discovery of gold in 1884. Miners then moved into the area as mining continued until about 1916. Another revival of mining activity started in the 1930's and ended at the start of World War II. Then, in 1978, mining began again in earnest. Throughout the early days there was livestock grazing; however, the entire study area, except for patented mining claims, is now public land administered by the Bureau of Land Management and it does not allow livestock grazing.

The land use history of the middle segment of the study area has been described extensively in past Job Progress Reports, (Constan 1979). The land use history of the southern segment is similar to the middle segment. This area was a summer resort and favorite hunting ground of several Indian tribes. The first major influx of white men arrived in the 1870's and 1880's as mining developed in the nearby mountains. Ranchers arrived shortly afterwards and soon large herds of cattle and sheep grazed the abundant grasslands adjacent to the mountains. In

1908, after the railroad arrived, the homesteaders arrived in large numbers and began to subdivide the rangelands. Farming increased rapidly and by 1977 about one-third, 287,000 acres, of the approximately 860,000 acres of rangeland was under cultivation, with 99 percent of the cultivation being dryland cropland. The southern segment remains about 89 percent private lands and 10 percent state lands.

The upper Missouri River segment of the study area has changed drastically since the Indians used it as hunting grounds. Now the large city of Great Falls occupies the north end and several other smaller towns are located along the river. Subdivisions have moved rapidly along the river and numerous homes are now found along much of the river. Farmers have farmed right to the river bank along many reaches of the river and extensive livestock grazing is practiced in the river bottom nearly everywhere else. Only the islands have retained any resemblance to what they may have been like in the days before the white man arrived.

Findings - middle and southern segments

Mule deer

Mule deer are distributed throughout these segments of the study area. They are found in all major vegetation types such as the breaks, agriculture, sagebrush-grasslands and grasslands. Mule deer observations are presented in Appendix Table 1.

During the 1979-80 winter mule deer were observed and classified. No distinct winter ranges were delineated, as the mild winter permitted mule deer to distribute themselves throughout most of their home range. Classification of 677 mule deer was made with a resulting fawn-adult ratio of 80 fawns per 100 adults (Table 1). An adequate sample was obtained in Hunting Districts 410, 417 and 426. By consulting Table 2, it can be seen that the fawn/adult ratio in the past two years in 417 and 426 increased from 50 to 74 and 74 to 83, respectively. Hunting district 410 did not change, remaining at 80 fawns per 100 adults. The past two years have had very good fawn production and survival in the study area; consequently, the mule deer population is on a strong uptrend.

Table 1. Mule deer winter classification by hunting district, 1979-80 winter.

Hunting District	Nos. classified	Classification Adults	Fawns	Fawn/adult ratio
410	279	155	124	80/100
412	4	2	2	100/100
417	106	61	45	74/100
418	17	10	7	70/100
426	271	148	123	83/100
Grand Totals	677	376	301	80/100

Table 2. Mule deer winter classification by hunting district, 1975-76 winter-1979-80 winter.

Hunting District	Winter Date	Nos. Classification	Classification Adults	Classification Fawns	Fawn/adult Ratio
410	1975-76	82	64	18	28/100
	1976-77	160	122	38	31/100
	1977-78	301	239	62	26/100
	1978-79	501*	278	223	80/100
	1979-80	279	155	124	80/100
417	1976-77	138	83	55	66/100
	1977-78	176	119	57	48/100
	1978-79	48	32	16	50/100
	1979-80	106	61	45	74/100
426	1975-76	1,271	920	351	38/100
	1976-77	376	256	120	47/100
	1977-78	67	47	20	43/100
	1978-79	263	151	112	74/100
	1979-80	271	148	123	83/100

* Classification by Ken Hamlin, Montana Department of Fish, Wildlife and Parks

Deer harvest figures are obtained from hunter questionnaires and are presented by hunting district in Table 3. The study area is composed of parts of hunting districts 410, 412, 417, 418 and 426. Since the study area has only small parts of H.D.'s 410, 412 and 417, total harvest figures in these areas are not representative of the harvest within the study area. Most of the harvest in H.D.'s 426 and 418 probably takes place on the study area portion of these two hunting districts; therefore, it is more representative. With this in mind, the most important facts relevant to the study area that can be obtained from Table 3 are the trends in harvest numbers, hunter success and hunter use. Overall, the trend is rising for harvest and hunter use. Success is up in three districts and down in two. These trends correlate with the obvious increase of the mule deer population.

White-tailed deer

In general, white-tailed deer are found in the study area where ever good brushy creek or riverbottom habitat is found. In the southern segment, major whitetail populations are located along the Judith River and Ross Fork Creek, major tributary to the Judith River. Smaller numbers are located along Wolf Creek and Dry Wolf Creek. In the middle segment major whitetail populations are found along Box Elder Creek, Armells Creek, Deer Creek, Warm Springs Creek and the Judith River.

Table 3. Total deer harvest from hunter questionaires 1977-1979.

Hunting District	Year	Hunters (Point)	Harvest (Point)	Percent Success	Hunter Days
410	1977	1,120	266	24	3,585
	1978	932	200	21	2,633
	1979	1,625	744	46	4,763
412	1977	1,699	839	49	6,266
	1978	1,493	566	38	5,134
	1979	2,245	955	43	8,955
417	1977	1,324	625	47	4,237
	1978	1,235	487	39	3,339
	1979	1,534	590	38	4,647
418	1977	1,810	592	33	8,448
	1978	1,200	367	31	4,564
	1979	1,716	414	24	7,285
426	1977	1,103	562	51	3,917
	1978	1,055	558	53	3,324
	1979	1,363	740	54	3,999

Few white-tailed deer observations were made last winter, primarily due to the mild winter which did not concentrate them (Appendix Table 1). Only 42 whitetails were classified and their fawn/adult ratio was 50 fawns per 100 adults. This ratio was much lower than the mule deer ratios obtained, and even though the sample size is small, it may be representative, as it appears that the white-tailed deer population in general has not been doing as well as the mule deer population.

Antelope

Antelope are widely distributed throughout the southern segment and the nonbreaks portion of the middle segment of the study area (Appendix Table 2).

Winter observations of antelope are plotted in Figure 7. Since the 1979-80 winter was mild, these antelope wintering sites may be very different from wintering sites used during normal or severe winters.

A complete summer survey of antelope in the southern segment will be done during July, 1980 and will be reported in next year's Job Progress Report.

The study area consists of portions of antelope hunting districts 471 and 480 and nearly all of H.D. 430. Therefore the antelope harvest figures for H.D. 430 are the only ones that are relevant to the study. Antelope harvest in H.D. 430 has been 250 permits, 135 killed, 54 percent success; 100 permits, 69 killed, 69 percent success; 150 permits, 81

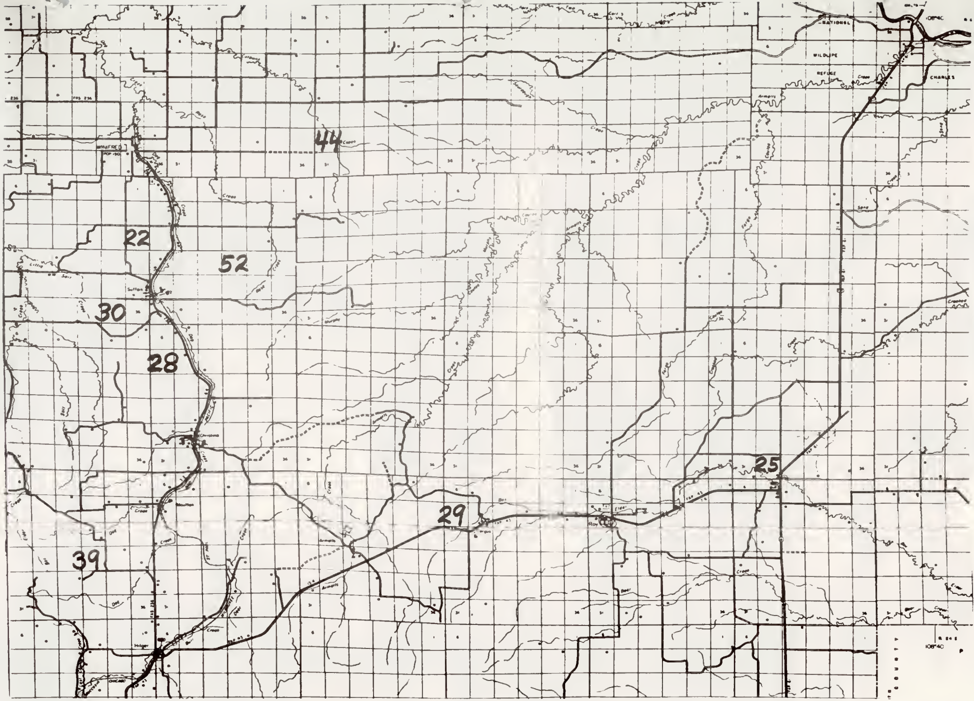

Figure 7. Antelope winter observations, January-March 1980.

killed, 58 percent success; in 1977, 78 and 79 respectively.

Elk

Elk are found primarily in the Little Belt Mountains adjacent to the southern segment of the study area. Since the study area boundary follows the foot of the Little Belt Mountains, few elk are observed on the study area except for large numbers of wintering elk that use the Montana Department of Fish, Wildlife and Parks' Judith Game Range and nearby areas. The Judith Game Range manager censuses all these elk and his reports can be found in the Region 4 Job Progress Reports titled "Big Game Survey and Inventory, Segment: Elk Surveys, Project No. W-130-R." Occasionally a few elk are observed in Fargo Coulee in the northeastern corner of the middle segment of the study area. Further research will verify numbers present.

Thirty-three elk were observed on Reed Hill on May 30, 1980 (Appendix Table 3). These elk were apparently using Reed Hill as an elk calving ground. On the same day 122+ elk were observed along the middle fork of the Judith River. This area supports a large number of elk each spring and it is a traditional elk calving area.

Other mammals - Beaver

Beavers are found throughout the two segments in all major creeks and in the Judith River. Beaver populations have flourished everywhere they have found a large and constant water flow and food.

Beaver cache counts have been made on the Judith River in recent years (Table 4). The 1979 counts were below the 1976-78 counts. This may be a result of the severe winters of 1977-78 and 1978-79 which adversely affected the beaver populations.

Table 4. Beaver cache counts - Judith River, 1974, 1976-1979.

Location	1974	1976	1977	1978	1979
Hobson-Spring Creek	12	21	29	16	19
Spring Creek-Warm Springs Creek	2	4	9	10	7
Warm Springs Creek-Dry Wolf Creek	9	11	11	9	4
Dry Wolf Creek-Mouth	6	5	5	7	6
Totals	29	41	54	42	36

Sharp-tailed grouse

Sharp-tailed grouse are distributed throughout the middle and southern segments of the study area (Appendix Table 4). Sharptail densities appear to be highest in the middle segment with greatest concentrations found in the grassland - agriculture - brushy draw complex west, north and east of the North Moccasin Mountains and in the same vegetation complex north and east of Hilger and Fergus, Montana.

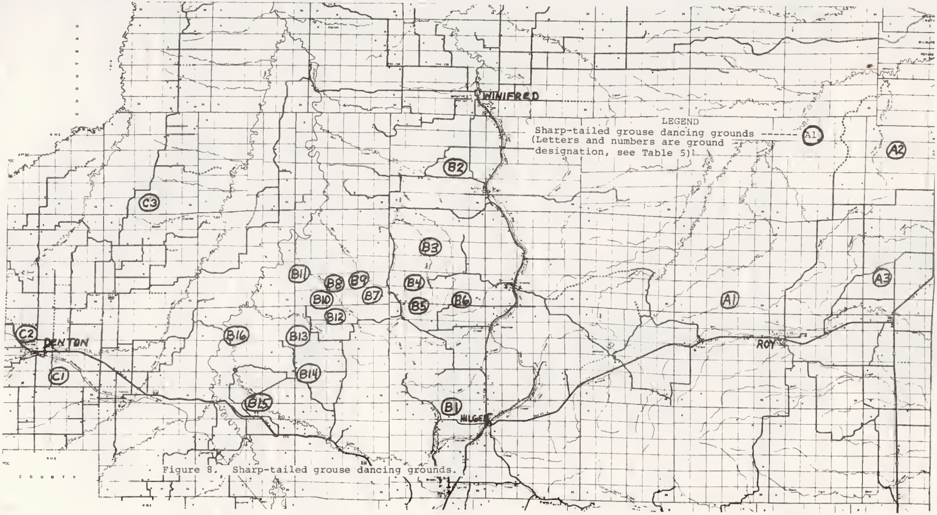
LEGEND
Sharp-tailed grouse dancing grounds ------ A1
(Letters and numbers are ground designation, see Table 5)
WINIFRED
DENTON
ROY
HILGER
A1
A2
A3
B1
B2
B3
B4
B5
B6
B7
B8
B9
B10
B11
B12
B13
B14
B15
B16
C1
C2
C3
CHOUTEAU
COUNTY

Figure 8. Sharp-tailed grouse dancing grounds.

During spring 1980, primary emphasis was placed upon locating sharptail dancing grounds. Most grounds were found by flying low over potential dancing ground sites in a supercub airplane from sunrise to about 3 hours after sunrise. This method was very successful as 22 new grounds were found (Table 5 and Figure 8).

Twenty-six previously known dancing grounds adjacent to the study area were also surveyed by airplane (Table 6). Censusing known dancing grounds by airplane was also very successful, and it only took approximately 20 percent of the time required by ground observations. The possibility of more inaccurate counts from the air versus counts from the ground is more than compensated for by the time and money saved using aerial censusing. Comparison of comparable data obtained from known grounds in 1980 and 1979 indicates that in the Arrow Creek area, 9 ground counts were up and 4 down in 1980 with a 40 percent total numbers increase over 1979. In the Winifred area 6 grounds were down and 2 were up in 1980 with a total numbers decrease of 15 percent. Overall, in both areas the male grouse counts were up to 21 percent over 1979.

Sharp-tailed grouse production ratios computed from the fall wing analyses were 226 juveniles per 100 adults in Fergus County and 425 juveniles/100 adults in Judith Basin County. Both ratios are above the 22 year average. Three broods were observed during the 1979 summer and they averaged 6.7 young per brood. Region 4 brood surveys averaged 7.5 young per brood.

Sage grouse

Sage grouse are found mainly in the eastern half of the middle segment of the study area (Appendix Table 5). This area has the only remaining extensive stands of sagebrush. Unfortunately for the sage grouse, there is a steady reduction of sage grouse habitat (sagebrush), as sagebrush-grasslands are being plowed up or sprayed to make way for croplands or sagebrush-free grasslands.

During the 1979 summer, four sage grouse broods were observed and they averaged 5.5 young per brood. Region 4 brood data averaged 6.5 young per brood. Sage grouse production ratios computed from the fall wing analyses were 289 juveniles per 100 adults. This was substantially above the 18 year average. Good survival of young was also verified by sage grouse being very plentiful during the fall hunting season.

Little effort was expended on finding sage grouse strutting grounds during spring 1980, as emphasis was placed upon locating sharp-tailed grouse dancing grounds. Next spring more effort will be placed upon locating strutting grounds. Two known sage grouse grounds were checked for activity; 26 males were observed on the Suffolk ground (Sec. 21, T20N, R19E) and 29 males were observed leaving the ground on Sec. 29, T19N, R23E.

Aerial surveys in February and early April found four areas that may be winter ranges; however, the mild winter may have permitted sage grouse to winter anywhere. Plentiful sign was observed on Sec. 4 and 5, T18N, R22E; Sec. 31, T20N, R22E; Sec. 6, T19N, R22E; Sec. 36, T20N, R21E; and Se. 1, T20N, R21E. Forty-five sage grouse were observed on

Sec. 28, T19N, R23E and 41 grouse were observed on Sec. 24, T19N, R22E. Future surveys will delineate sage grouse winter ranges.

Table 5. Maximum numbers of male sharp-tailed grouse observed on newly discovered breeding grounds, spring 1980.

Ground Designation and Location[1]	Year 1979	 1980
Bohemian Corners		
A-1 Sec. 34, T19N, R21E	.	6[2]
A-2 Sec. 8, T20N, R23E	.	27
A-3 SW¼ Sec. 20, T20N, R23E	.	12
North Moccasins		
B-1 Sec. 3, T17N, R18E	.	1*
B-2 NW¼S23, T20N, R18E	.	23
B-3 SE¼S16, T19N, R18E	.	18
B-4 SE¼S29, " "	.	17
B-5 NE¼S 5, T18N, "	.	15
B-6 S½S35, T19N, "	.	16
B-7 E½S35, " , R17E	.	10
B-8 S28, " "	.	2*
B-9 E½S27, " "	.	26
B-10 S32, " "	.	13
B-11 S19, " "	.	27
B-12 SW¼S4, T18N, "	.	32
B-13 SE¼S7, " "	.	15
B-14 N½S30 " "	.	28
B-15 SW¼S34 " , R16E	.	8
B-16 SW¼S9 " "	.	6
Denton		
C-1 N½S27, T18N, R14E	21	22
C-2 S½S18, " "	15	14
C-3 NW¼S34, T20N, R15E		19

[1] See figure 8 for plotted locations.
[2] Underlined in year ground first counted.
* Needs further inventory to make sure it is a permanent ground.

Table 6. Maximum numbers of male sharp-tailed grouse observed on breeding grounds, springs 1976-1980.

Ground Designation and Location			Year		
	1976	1977	1978	1979	1980
A S15, T20N, R15E	30[1]	NC[2]	42	49	29
B S24, " "	16	NC	NC	NC	27
C S16, " R16E	14	NC	14	17	14
D S 5, " "	16	NC	12	16	34
F E½S34, T22N, R15E	18	NC	5	14	27
G SE¼S24, " "	10	NC	0	8	19
H E½S32, " "	31	NC	NC	2	30
I NW¼S18, " R16E	12	NC	NC	0	7
J SE¼S9, " R17E	24	22	NC	17	15
K NE¼S6, T21N, R18E		13	NC	13	0
L SW¼S27, T22N, "		3	NC	6	NC
M S½S28, " "		24	NC	0	NC
N NE¼S2, T21N, R17E		18	15	8	7
P NE¼S33, T22N, R17E		18	11	13	3
R* NE¼S7, " "		3	NC	1	0
S SW¼S15, T21N, R18E		18	15	7	14
V SE¼S3, T20N, R15E			19	18	8
W SE¼S12, T22N, R16E			28	6	0
X NE¼S21, T21N, R15E			8	11	20
Y SW¼S14, " "			5	10	16
Z SW¼S18, " R16E			3	3	1
AA NW¼S12, T20N, "	(maybe abandon)		NC	0	0
BB NW¼S19, T21N, R18E				7	0
CC NE¼S31, " "				22	19
DD S16, T22N, R17E				11	5
EE S18, T21N, R16E				15	20
FF SW¼S21, T20N, R19E				14	16
GG SE¼S1, T21N, R15E				11	19
HH SW¼S36, T22N, "					17

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[1] Underlined in year ground first found and counted.
[2] NC=Not Counted
* Need further inventory to make sure it is a permanent ground.

Pheasants

Pheasants are found primarily associated with habitat that consists of very brushy draws, creeks and riverbottoms that meander through croplands. Major pheasant concentrations are found along the Judith River and Ross Fork Creek in the southern segment. In the middle segment, the best habitat is found along the Judith River, and the following major creeks and their tributaries: Box Elder Creek, Crooked Creek, Armells Creek, Dog Creek, Wolf Creek and Warm Springs Creek.

A crowing count route was run along Dog Creek in May 1980. The route consisted of 17 stops starting at Moulton and running north on County Highway 236 to a point 0.7 mile south of Winifred. Dog Creek is a small creek that roughly parallels the highway for the entire distance of the route. It is a narrow bottom, never more than a ½ mile wide, that has dense brush along the creek with grain and hay fields adjacent to the creek. An average of 10.5 calls per stop was recorded.

During summer 1979, three broods were observed (Appendix Table 6). They averaged eight young per brood. Region 4 brood data average 6.2 young per brood.

The Fergus County male pheasant ratios from spurs for 1979 was 325 juveniles per 100 adults. This was down from 363 in 1978 and was also the lowest ratio during the 1974-1979 period when the average ratio was 381.

Hungarian partridge

Huns are the most widely distributed game bird on the study area. They are found throughout the nonbreaks habitat and are even occasionally found in the breaks habitat. The hun population has been at a low point after the severe winters of 1977-78 and 1978-79; consequently, few huns have been observed during the report period.

Only one brood (10 young) was observed during the 1979 summer. Region 4 hun brood data averaged 10.2 young per brood. Region 4 hun production ratios taken from the fall wing analyses were 560 juveniles per 100 adults in Fergus County and 400 juveniles per 100 adults in Judith Basin County. These ratios are well above the 18 year average and they come after 2 years of below average ratios.

During the 1979 hunting season, check stations and field checks found few huns harvested.

Waterfowl

In the spring, waterfowl are distributed throughout the southern and middle segments of the study area. Ducks are found breeding and raising broods on most stockponds and reservoirs that hold sufficient water to attract them. Geese are found using only a few large reservoirs, stockponds and the Judith River. After two wet years when nearly every pond or creek had plenty of water in the spring, the 1980 spring had little water available for nesting waterfowl. Also, the drought has continued into the summer and numerous bodies of water have dried up before brood raising has finished. After 2 years of excellent waterfowl reproduction, it appears that the 1980 production will be very significantly down. During July 1979, 22 duck broods were observed, (Appendix Table 7), and they averaged 5.3 young per brood. In 1980, 12 broods were observed and they averaged 5.1 young per brood. The brood size difference between 1979 and 1980 is insignificant; however, the number of broods observed throughout the study area in 1980 was much lower than in 1979. In 1979, five Canada geese broods were observed and they averaged 3.8 young per brood. In 1980, three Canada geese broods were observed and they averaged 4.3 young per brood.

Nearly all waterfowl leave the study area each fall after freeze-up; however, some mallard ducks stay and winter on Warm Springs Creek which does not freeze during the winter. A few reaches of the Judith River also remain unfrozen for short periods of time and winter a few ducks.

Finds - Little Rocky Mountains segment

Bighorn sheep

Surveys of bighorn sheep in the Little Rocky Mountains commenced in March, 1979 and continued throughout the report period (Appendix Table 8). Through these surveys data were gathered and are presented below.

Distribution

Aerial and ground observations of bighorns were used to determine their distribution during the winter, spring and early summer. All winter observations of bighorns were in an area approximately 4 miles by ½ mile (Figure 9). This winter range, consisting entirely of Bureau of Land Management lands, is along the southern edge of the Little Rocky Mountains. It consists of a mixture of conifers, grass-covered slopes, and rough, rocky terrain interspersed with cliffs and ledges. This winter range has a southern exposure that varies from southwestern to south-eastern. Elevation is between 4200 and 5000 feet above sea level and it is dominated by Saddle Butte, Silver Peak and Sugar Loaf Butte.

As with many bighorn winter ranges throughout Montana, these bighorns remained on the winter range far into the spring. Lambing areas are on the winter range and observations in August, 1979 revealed that 26 bighorns were using an area less than ½ mile from their winter range. Observations of 3 bighorns, 2 ewes and a lamb, in September indicated it is very probable that a portion of the ewes and lambs remain on the winter range on a yearlong basis. The rams' summer range has not yet been determined; however, they do appear to move off the winter range.

Range Condition

Condition of the bighorns' winter range is excellent, and it is the opinion of the author that the quality and quantity of grass, forbs and other groundcover on this winter range is better than can be found on the bighorn winter ranges of southwestern Montana.

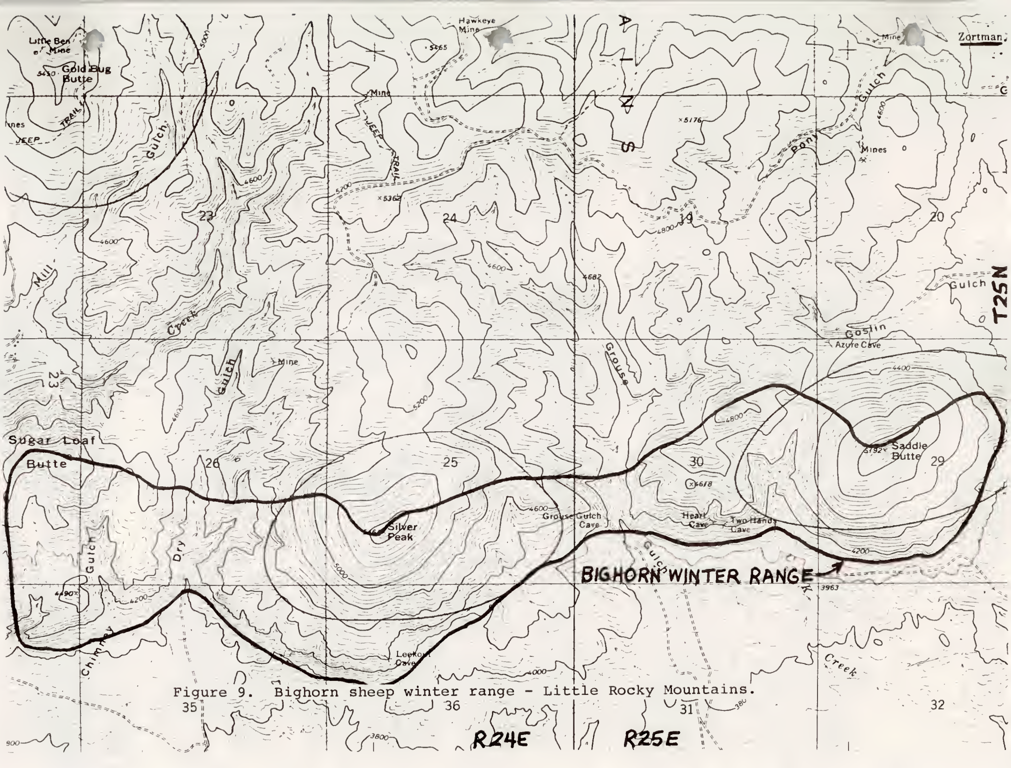

Figure 9. Bighorn sheep winter range - Little Rocky Mountains.

Population Characteristics

The highest number of bighorns counted during the numerous surveys was 32. After evaluating all surveys, it is doubtful if the total bighorn population exceeds 35 sheep. Reproduction and/or survival appears to be adequate, as 18 ewes with 9 lambs were observed March 30, 1979, indicating good lamb survival over the severe winter of 1978-79. The surveys of August 10, 1979 and December 12, 1979 indicated good survival of lambs, with an estimated 50 lambs per 100 ewes. The spring survey of June 17, 1980 found 15 ewes with 8 lambs, again showing adequate reproduction. A total of 52 sheep was originally planted in 1972 and 1974, thus, this sheep population may have decreased significantly during the past 6 years. No old rams have been observed, which also indicates that something is wrong with this sheep herd. Several local residents feel that there is extensive poaching of these bighorns and the lack of old rams certainly indicates interference by man, as natural mortality of mature rams is normally very low.

Conflicts

This study area was primarily added because two large gold mining operations began reworking the old gold mining areas in the Little Rocky Mountains. These two operations are very large, and they are operating at full speed. The actual mining and processing sites appear to have little conflict with the bighorns; however, there are several side effects which these mining operations have caused that may drastically affect the bighorns. One is that a large number of people have moved into the mining area. These people may become a source of more poaching encounters which will increase harassment of the sheep. The second problem is that there has been an extensive rush to stake mining claims and develop more gold mines near the major mining operations. This activity has spread onto the bighorns' primary range; for instance, a road was built across the bighorns' winter range last year. Activity related to mining on the bighorns' winter range or other critical use areas will have detrimental effects on the bighorns.

Other big game

Only a few mule deer were observed during the report period. There were no observed concentrations of mule deer during the past winter, making it impossible to delineate mule deer winter ranges. During last winter there appeared to be no competition between mule deer and bighorns.

No white-tailed deer or elk were observed during the report period. Further surveys will attempt to delineate mule deer distribution and to determine the extent of elk and white-tailed deer in the Little Rocky Mountains.

Game and nongame birds

Observations of blue grouse and ruffed grouse have been made. Male blue grouse were observed on territories in the spring and male ruffed grouse were heard druming. Additional surveys in the future will attempt to determine the extent of these two game birds.

No surveys have been made to determine the presence and/or extent of turkeys or nongame birds. Future surveys will investigate these species.

Findings - Middle Missouri River segment

Canada Geese

Breeding season

During the spring of 1980, a Canada goose nest and production survey was conducted in the study area. The first recorded nest was located on March 27, at which time it was in the second week of incubation. The last active nests which were also half way through incubation, were located on May 22. By back dating and estimating hatching dates, the 1980 nesting season extended from March 1 through June 5, or 97 days. A majority of the nests located were initiated about the first of April, with a peak of hatch during the first week of May.

A breeding population survey was also conducted on the ground. A breakdown of this survey by river sections can be seen in Table 7. A total population of 257 Canada geese was observed, with 111 birds (43 percent) recorded as pairs or singles.

A total of 53 nests was located on this 90-mile reach of the Missouri River (Table 8; Figure 10). A majority of the nesting effort (41 nests, 77 percent) occurred in the reach from Hardy to Ulm. The fate was determined for 42 nests (79 percent) located in 1980. Table 9 presents these results. For known fate nests, hatching success (one or more eggs hatched) was 85.7 percent. This high nest success rate was comparable to that found on the Middle Missouri River study downstream from Morony Dam to Robinson Bridge, which averaged 85 percent success from 1977 to 1979.

Table 7. Canada goose breeding population survey, Missouri River (Holter Dam - Great Falls), April 1980.

Section	Pairs	Singles	Groups	Total
Holter Dam to Craig	11	0	28	50
Craig to Cascade	21	0	61	103
Cascade to Ulm	17	1	48	83
Ulm to Great Falls	4	4	9	21
Total	53	5	146	257

Table 8. Canada goose nest survey - 1980 Missouri River.

Section	No. Nests
Holter Dam to Craig	1
Craig to Hardy	4
Hardy to Cascade	20
Cascade to Ulm	21
Ulm to Great Falls	7
Total	53

Table 9. Canada goose nest fate - 1980 Missouri River (Holter - Great Falls).

Fate	Number	Percent	Known Fate
Hatched	36	68	85.7
Deserted	5	9	11.9
Destroyed	1	2	2.3
Subtotal	42		
Undetermined	11	21	
Total	53		

Desertion, at 12 percent, was the greatest cause of nest loss, with destruction due to predation resulting in only 2.3 percent nest loss. Egg success (Table 10) was 83 percent with 195 of 235 eggs located hatching. This was lower than the 94 percent success found in 1979 on the Middle Missouri study downstream. Eighteen eggs (7.7 percent) were lost from nest desertion. Nineteen eggs (8.1 percent) were left in successful nests due to infertility or dead embryos. Only three eggs (1.3 percent) were lost in one predated nest. Egg fertility was 94 percent compared to 95 percent in the 1979 study downstream.

The average clutch size was 6.0 eggs for 47 nests with complete clutches. Table 11 presents the frequency distribution of clutch sizes. A majority (83 percent) of the nests had from 5-7 eggs. Clutch size ranged from 3-10 eggs. The nest with 10 eggs was successfully hatched.

Table 10. Canada goose egg success (known fate nests).

Fate	No. Eggs	Percent
Hatched	195	83.0
Deserted	18	7.7
Destroyed	3	1.3
Infertile	15	6.4
Dead Embryos	4	1.7
	235	

94 percent fertility.

Table 11. Frequency distribution clutch sizes.

Clutch Size	No.	Percent
3	4	8.5
4	1	2.1
5	12	25.5
6	13	27.7
7	14	29.8
8	1	2.1
9	1	2.1
10	1	2.1
Average = 6.0	47	

Known fate successful nests (36) produced 195 young, for an average of 5.4 young per nest. Production for the 11 nests of undetermined fate was calculated by using the average clutch size of 6, egg fertility at 94 percent, and nest success at 85.7 percent, to give an estimated production of 53 young. These figures would indicate a total production of 248 young Canada geese in 1980. This would indicate a productivity of 2.8 young per river mile over the 90-mile reach from Holter Dam to Great Falls. This compares to an average production of 3.8 young per river mile for the 1977 through 1979 seasons on the Missouri River from Carter Ferry to the Robinson Bridge.

Table 12 present data on nest material and nest site vegetation. Litter was the predominant nest material, composing 86.5 percent of the nests. This compares to 88.8 percent litter from the Middle Missouri reach downstream in 1979. Willow was the preferred nest site vegetation, with 67.3 percent of the nests located in this type. This figure is again comparable to that found in previous studies downstream.

Table 12. Nest site vegetation and nest material.

Nest Site Vegetation	No. Nests	Percent
Willow	35	67.3
Grass	6	11.5
Rose spp.	3	5.7
Dogwood	1	1.9
Ragweed	4	7.7
Litter	3	5.7
	52	

Nest Material	No. Nests	Percent
Litter	45	86.5
Driftwood	5	9.6
Dogwood	2	3.8
	52	

The height of nest site vegetation is presented in Table 7. Fifty percent of the nests were located in vegetation less than 3 feet in height, which is similar to previous downstream studies. Sixty-five percent of the nests were within 25 feet of open water (Table 13), which compares to 60 percent within 20 feet from 1979 data for the Morony Dam to Robinson Bridge reach. From Table 13 it can be seen that 50 percent of the nests were less than 4 feet above the river level at the time of the nest surveys. For the Morony Dam to Robinson Bridge reach of the Missouri River in 1979, this figure was 39.1 percent of the nests less than 4 feet above the river level. This difference probably relates to the type and availability of islands.

All the Canada goose nests located in 1980 were found on islands. There were 100 usable islands available between Craig bridge and Great Falls during the nesting season. Table 14 gives a breakdown of the number and percent of islands and nests by river section. Canada geese preferred the Hardy to Ulm reach, with 78.9 percent of nests and only 52 percent of the islands located in this reach. The Craig to Hardy and Ulm to Great Falls sections had only 16.6 percent and 20.8 percent island utilization, respectively, while the Hardy to Ulm section saw an average island use of 44.2 percent. The overall island utilization for nest sites was 32 percent, with an average of 1.6 nests per island used. In 1979, island utilization on the Missouri River from Morony Dam to Robinson Bridge was 41 percent, with an average of 2.5 nests per island used.

Table 13. Nest site vegetation height, distance to water, and height above water, 1980.

Vegetation Height	No. Nests	Percent
0-1 ft.	7	13.5
1-2	13	25.0
2-3	6	11.5
3-4	10	19.2
4-5	2	3.8
5-6	1	1.9
6-7	1	1.9
7-8	0	0
8-9	2	3.8
9-10	0	0
10+	10	19.2
Distance to water		
0-5 ft.	14	26.9
6-10	7	13.5
10-25	13	25.0
26-50	11	21.2
51-75	3	5.8
76-100	2	3.8
>100	2	3.8
Height above water		
0-1 ft.	0	0
1-2	4	7.7
2-3	10	19.2
3-4	12	23.1
4-5	5	9.6
5-6	5	9.6
6-7	10	19.2
7-8	3	5.8
8-9		0
9-10		0
10+	3	5.8

Table 15 presents information on nests and islands per river mile. The average number of islands/mile was 1.2, with an average of 0.64 nests/mile. Comparable figures from 1979 on the Missouri River downstream were .93 islands/mile and .93 nests/mile.

Data on multiple nesting on islands are shown in Table 16. From the table, it can be seen that 40.4 percent of nests (which accounted for 65.5 percent of the islands used) were single nest islands. A majority (60 percent) of the nests were located on islands that contained more than one nest. Multiple nesting was more prevalent on the Missouri River downstream, where from 1977 through 1979, 80 percent of the nests were located on islands with more than one nest.

Table 14. Number of Canada goose nests and percent islands used per river section - 1980.

Section	No. Islands	Percent	No. Nests	Percent	No.	Percent Islands Used
Craig to Hardy	24	24.0	4	7.7	4	16.6
Hardy to Cascade	31	31.0	20	38.5	11	35.4
Cascade to Ulm	21	21.0	21	40.4	12	57.5
Ulm to Great Falls	24	24.0	7	13.5	5	20.8
Total	100		52		32	Average 32.0

Table 15. Canada goose nests and islands per river mile, 1980.

Section	Miles	Islands/Mile	Nests/Mile
Craig to Hardy	14.4	1.67	0.17
Hardy to Cascade	12.7	2.44	1.57
Cascade to Ulm	24.5	.86	.86
Ulm to Great Falls	29.8	.81	.23
Total	81.4	1.23	.64

Table 16. Number of islands and nests by frequency of nests per island.

No. Nests/Island	No. Islands	Percent	No. Nests	Percent
1	21	65.6	21	40.4
2	6	18.8	12	23.1
3	3	9.4	9	17.3
4	1	3.0	4	7.7
5				
6	1	3.0	6	11.5
	32		52	

In summary, the Missouri River between Holter Dam and Great Falls appears to be a significant and successful Canada goose production area in Montana. With 86 percent nest success, this area produced approximately 250 goslings in 1980. A majority of the nesting effort occurred between Hardy and Ulm. The reach of river from Holter Dam to Hardy would appear to be high quality Canada goose nesting habitat, with available and preferred gravel bar-willow type islands. However, in 1980 only five nests were located in this reach. At this time, one possible explanation for this unexpected lack of nesting effort may be human disturbance. This reach of river has rather extensive bank development of summer homes and recreation areas and represents one of the best and most highly utilized trout fisheries in the state. Intensive human activity was noted this spring during a nest survey from Holter Dam to Craig Bridge, a distance of 8 miles. Forty-two fishermen on shore and in five boats were encountered during this mid-week survey in late March when nest initiation was occurring. In this particular reach, every island experienced human activity. This degree of human activity may be one factor in reducing nesting effort in this reach.

In the Ulm to Great Falls reach, a majority of the nesting effort occurs in the upper few miles. The lower part of this reach contains fewer islands and islands sufficiently large to preclude nesting activity.

NONGAME BIRDS

Great Blue Herons

Great blue herons were found throughout the entire reach from Holter Dam to Great Falls. Two active rookeries were located in 1980. One rookery at Sec. 4, T19N, R2E had 24 nest structures. A second rookery at Sec. 11, T19N, R2E contained 18 nest structures.

Osprey

Several osprey were observed in the upper reaches of the study area during spring 1980. One active nest which produced young in 1980 was located at the mouth of Little Prickly Pear Creek.

Furbearers

River otter runs and slides were observed along the Missouri River below Ulm. Residents south of Great Falls report their presence.

Table 17 presents beaver cache counts on the Missouri River previously conducted by Game Management personnel. These counts and data on distribution and habitat use will be collected during the fall of 1980.

Table 17. Beaver cache counts - Missouri River, Holter Dam - Great Falls.

Section	1954	1968	1969	1970	1971	1972	1975
Holter Dam to Cascade	34	20	20	20	26	26	19
Cascade to Ulm	21	16	12	8	21	12	12
Ulm to Great Falls	27	26	18	15	27	17	5

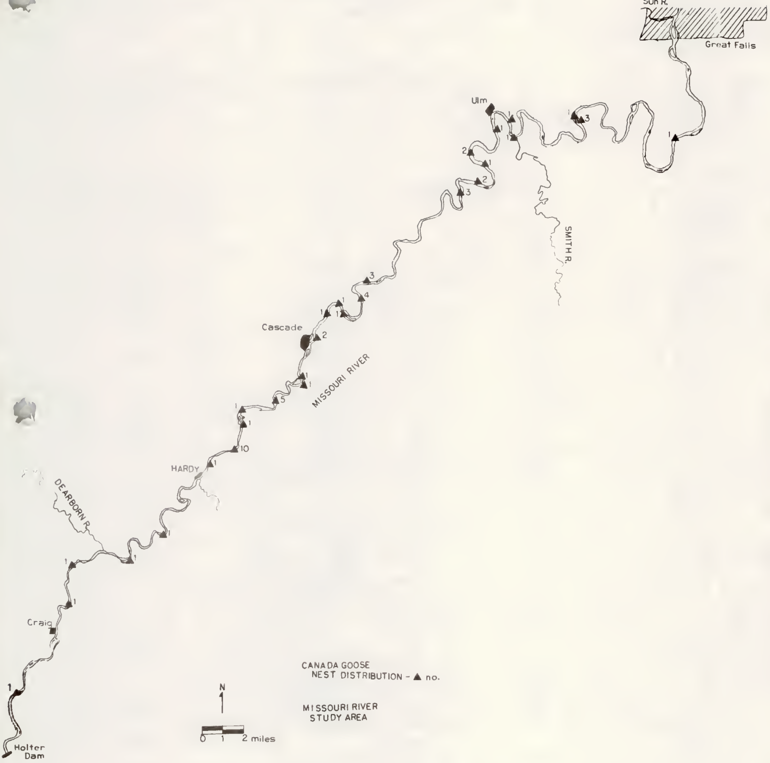

Figure 10. Canada goose nest distribution.

Appendix Table 1. Mule deer and white-tailed deer (as noted) observation, July 1979 - June 1980.

Date	Hunting Unit	Nos. Obs.	Classification	Location
10/29/79	417	26		S4,5, T18N, R20E
"	"	6 (WT)		S5 " "
11/ 5/79	"	4		" " "
"	"	4 (WT)		" " "
11/ 6/79	"	5		S22 , T18N, R19E
"	"	1 (WT)	Buck	S34 , T18N, R19E
11/27/79	"	7		S19 , T20N, R19E
11/28/79	"	6		S20 , " "
12/13/79	"	10		S 6 , T19N, R21E
"	"	9		S20 , " "
12/20/79	426	4	2 does, 2 fawns	S31 , T18N, R16E
1/15/80	412	3	2 does, 1 fawn	S12 , T17N, R18E
2/18/80	410	22	11 does, 11 fawns	S15 , T20N, R23E
"	"	24	12 does, 12 fawns	S33 , T21N, "
"	"	4	4 adult bucks	S28 , " "
"	"	16	8 does, 8 fawns	S15 , " "
"	"	9	6 does, 3 fawns	S15 , " "
"	"	4	1 doe, 3 fawns, 1 yearling buck	S14 , " "
"	"	7	3 does, 4 fawns	S14 , " "
"	"	3	1 doe, 2 fawns	S36 , T22N, "
"	"	7	4 does, 3 fawns	S16 , T21N, "
"	"	26	15 does, 11 fawns	S21 , " "
"	"	28	13 does, 13 fawns, 2 bucks	S 1 , T20N, R22E
"	"	9	4 does, 5 fawns	S 2 , " "
"	"	19	10 does, 8 fawns, 1 adult buck	S 2 , " "
"	"	18	7 does, 6 fawns 5 yearling bucks	S 2 , " "
"	"	8	4 does, 4 fawns	S14 , " "
"	"	18	10 does, 7 fawns, 1 buck	S11 , " "
"	"	2	1 doe, 1 buck	S 4 , T20N, R22E
"	"	17	10 does, 7 fawns	S 4 , " "
"	"	11	5 does, 6 fawns	S 2 , " R21E
"	"	4	2 does, 2 fawns	S25 , " "
"	417	11	6 does, 5 fawns	S23 , T19N, R21E
"	"	17	7 does, 9 fawns, 1 buck	S24 , " "
"	"	11	5 does, 5 fawns, 1 buck	S26 , " "
"	"	12	7 does, 5 fawns	S25 , " "
"	"	20	12 does, 8 fawns	Armells Creek
"	"	1	Yearling buck	" "
"	"	79	-	S 5 , T19N, R21E
"	410	3	2 does, 1 fawn	S14 , T20N, R20E
"	"	9	5 does, 4 fawns	S35 , " "

Appendix Table 1 (continued). Mule deer and white-tailed deer (as noted) observation, July 1979 - June 1980.

2/18/80	417	27	18 does, 9 fawns	S27,	T19N,	R20E
"	"	7	3 does, 4 fawns	S20,	"	"
"	"	17	-	S27,		R19E
"	410	11	6 does, 5 fawns	S30,	T20N,	"
3/20/80	417	3(WT)	2 adults, 1 fawn	S 9,	T18N,	R20E
3/22/80	426	8	4 adults, 4 fawns	S36,	T20N,	R18E
"	"	8	5 adults, 3 fawns	"	"	"
"	"	16	10 adults, 6 fawns	S35,	T21N,	"
"	"	9	5 adults, 4 fawns	S24,	T19N,	"
"	412	6(WT)	3 adults, 3 fawns	S27,	T17N,	"
"	"	18(WT)	12 adults, 6 fawns	S16,	"	"
"	"	1(WT)	Adult	S16,	"	"
"	"	2	adult, fawn	S 5,	"	"
"	426	13	7 adults, 6 fawns	S 3,	T20N,	"
"	"	14	8 adults, 6 fawns	S29,	T19N,	"
3/22/80	426	7	4 adults, 3 fawns	S32,	T19N,	R18E
"	"	4	2 adults, 2 fawns	S36,	T20N,	R17E
"	"	6	3 adults, 3 fawns	S26,	T19N,	"
"	"	3	2 adults, 1 fawn	S35,	"	"
"	"	3	1 adult , 2 fawns	"	"	"
"	"	9	5 adults, 4 fawns	S 2,	T18N,	"
"	412	1	1 fawn	S11,	"	"
"	426	15	6 adults, 9 fawns	S23,	T19N,	R16E
"	"	10	6 adults, 4 fawns	S26,	"	"
"	"	16	9 adults, 7 fawns	S35,	"	"
"	"	6	3 adults, 3 fawns	S15,	T18N,	"
"	"	14	9 adults, 5 fawns	S27,	"	"
"	"	13	7 adults, 6 fawns	S 3,	T17N,	"
"	"	51	28 adults, 23 fawns	S 9,	T18N,	"
"	"	7	3 adults, 4 fawns	S34,	T19N,	"
"	"	6	3 adults, 3 fawns	S20,	T18N,	"
"	"	6	4 adults, 2 fawns	"	"	"
"	"	23	12 adults, 11 fawns	S29,	"	"
"	412	8	-	S19,	"	R18E
"	"	22	-	S19,	"	"
"	"	10	-	S20,	"	"
"	"	6(WT)	-	S13,	T17N,	R17E
3/27/80	418	7	5 adults, 2 fawns	S 9,	T13N,	R12E
"	"	17(WT)	12 adults, 5 fawns	S18,	"	R14E
"	"	10	5 adults, 5 fawns	S12,	"	R13E
4/18/80	426	27	—	S12,	T20N,	R17E
5/ 9/80	418	17		S 4,	T13N,	R15E
"	"	2		S33,	T13N,	R15E
"	"	3		S 8,	T12N,	"
5/30/80	"	12		S30,	T14N,	R12E
"	"	4		S23,	T15N,	R11E
"	"	1		S24,	"	R10E

Appendix Table 2. Antelope observations, July 1979 - June 1980.

Date	Nos. Obs.	Classification	Location
1/ 7/80	25		S32, T19N, R23E
2/18/80	44		S30, T21N, R20E
"	52		S22, T20N, R19E
"	28		S 7, T19N, "
3/20/80	29		S 7, T18N, R21E
3/22/80	22		S13, T20N, R18E
"	30		S35, " "
"	39		S22, T18N, "
"	4		S 4, " R17E
3/27/80	4		S 5, T13N, R14E
4/15/80	5		S11, T20N, R22E
5/ 9/80	7		S33, T14N, R14E
"	6		S27, " "
"	1		S36, " "
"	1		S 4, T13N, R15E
"	2		S 7, " R14E
"	2		S12, " R13E
"	5		S11, " "
"	8		S 1, " R12E
"	5		S15, " R14E
"	14		S14, " "
"	7		S16, " R15E
"	10		S 9, " "
"	7		S24, " R13E
"	5		S15, " "
"	2		S26, " "
"	6		S17, T12N, R15E
"	5		S17, " "
5/ 9/80	1		S13, T12N, R14E
"	9		S 8, " "
"	12		S 5, " "
"	2		S 6, " "
"	8		S 4, " R13E
"	9		S 7, " "
"	4		S30, " R15E
"	6		S33, T15N, R13E
5/27/80	3		S20, T19N, R23E
"	16		S35, T20N, R22E
"	1		S 3, T19N, "
"	1		S 4, " "
"	1		S 6, T18N, "
5/30/80	2		S13, T14N, R12E
"	1		S14, " "
"	1		S15, " "
"	1		S16, " "
"	1		S21, T16N, R10E
"	4		S32, T17N, "
"	2		S17, " R 9E

Appendix Table 3. Elk observations July 1979 - June 1980.

Date	Nos. Obs.	Classification		Location
5/30/80	29		Reed Hill	S25, T14N, R11E
"	1		" "	S26, " "
"	1		" "	S23, " "
"	2		" "	S11, " "
"	3			S25, T16N, R10E
"	122+			S36, T13N, R 9E and S31, T13N, R10E

Appendix Table 4. Sharp-tailed grouse observations July 1979-June 1980.

Date	Nos. Obs.	Classification	Location
8/20/79	5	1 adult, 4 young	S26, T21N, R16E
10/29/79	150+		S 9, T18N, R20E
11/ 5/79	30+		" " "
11/ 6/79	2		S22, R19E
11/28/79	35		S20, T20N, R19E
3/17/80	21		SW¼S10, T18N, R18E
3/22/80	10		S22, " "
"	19	19 males on dancing ground	S30, T21N, R19E
4/ 4/80	6	6 " " " "	S34, T19N, R21E
"	27	27 " " " "	S 8, T20N, R23E
"	12	12 " " " "	SW¼S20, " "
"	16	16 " " " "	S½S35, T19N, R18E
4/18/80	1	1 male(maybe dancing ground)	S3, T17N, R18E
"	23	23 males on dancing ground	NW¼S23, T20N, R18E
"	16	16 males " " "	S28, T20N, R19E
"	14	14 " " " "	SW¼S15, T21N, R18E
"	7	7 " " " "	NE¼S 2, " R17E
"	3	3 " " " "	NE¼S33, T22N, "
"	15	15 " " " "	SE¼S 9, " "
"	5	5 " " " "	S16, " "
"	18	18 " " " "	SE¼S16, T19N, R18E
"	17	17 " " " "	SE¼S29, " "
"	15	15 " " " "	NE¼S 5, T18N, "
"	10	10 " " " "	E½S35, T19N, R17E
"	2	2 " " " "	S28, " "
5/ 1/80	22	22 " " " "	N½S27, T18N, R14E
"	14	14 " " " "	S½S18, " "
"	19	19 " " " "	NW¼S34, T20N, R15E
5/ 1/80	29	29 males on dancing ground	S15, T20N, R15E
"	27	27 " " " "	S24, " "
"	14	14 " " " "	S16, " R16E
"	34	34 " " " "	S 5, " "
"	8	8 " " " "	SE¼S3, " R15E
"	20	20 " " " "	NE¼S21, T21N, "
"	16	16 " " " "	SW¼S14, " "
"	1	1 " " " "	SW¼S18, "R16E
"	20	20 " " " "	S18, " "
"	19	19 " " " "	SE¼S1, " R15E
"	17	17 " " " "	W½S36, T22N, R15E
"	27	27 " " " "	E½S34, " "
"	30	30 " " " "	E½S32, " "
"	19	19 " " " "	SE¼S24, " "
"	7	7 " " " "	NW¼S18, " R16E
"	26	26 " " " "	E½S27, T19N, R17E
"	13	13 " " " "	S32, " "
"	27	27 " " " "	S19, " "
"	32	32 " " " "	SW¼S4, T18N, "
"	15	15 " " " "	SE¼S7, " "
"	28	28 " " " "	N½S30, " "
"	8	8 " " " "	SW¼S34, " R16E
"	6	6 " " " "	SW¼S9, " "

Appendix Table 5. Sage grouse observations July 1979 - June 1980.

Date	Nos. Obs.	Classification	Location
7/ 6/79	5	1 adult, 4 young	S22, T24N, R24E
7/31/79	4	1 adult, 3 young	S30, T21N, R19E
8/13/79	8	1 adult, 7 young	S 7, T19N, R21E
8/22/79	9	1 adult, 8 young	So. of Roy
2/18/80	45		S28, T19N, R23E
4/ 4/80	41		S24, " R22E
"	Sign	Plentiful sign in snow	S4&5, T18N, "
"	3		S8, T19N, "
"	Sign	Plentiful sign in snow	S31, T20N, R22E; S6, T19N, R22E; S36, T20N, R21E; S1, T20N, R21E
4/18/80	26	26 males on strutting ground	S21, T20N, R19E
5/ 6/80	29	(grouse leaving ground)	S29, T19N, R23E
6/17/80	4	4 adults	S18, T21N, R21E

Appendix Table 6. Pheasant observations, July 1979 - June 1980.

Date	Nos. Obs.	Classification	Location
7/27/79	10	1 adult, 9 young	S9, T16N, R14E
8/20/79	10	1 adult, 9 young	S5, T17N, R16E
9/ 1/79	6	1 adult, 5 young	S16, T18N, R15E
10/29/79	15		S9, T18N, R20E
11/ 5/79	5		" " "
11/ 6/79	6		S22, " R19E
11/26/79	20		S22, " "
11/27/79	40+		S19, T20N, R19E
11/28/79	40+		S20, " "
1/15/80	7	5 hens, 2 cocks	S12, T18N, R21E
3/ 6/80	15	9 hens, 6 cocks	Junction Arrow Creek & Highway 80
3/27/80	8		S9&10, T14N, R14E
"	1		S16, " "
5/ 9/80	2	1 hen, 1 cock	S15, T19N, R15E

Appendix Table 7. Waterfowl observations July 1979 - June 1980

Date	Nos. Obs.	Ducks/ Geese	Classification	Location
7/ 2/79	39	Ducks	7 adults, 32 young	Denton and vicinity
7/ 6/79	34	"	6 adults, 28 young	S22&23, T24N, R24E
"	28	Geese	9 adults, 19 young	" " "
7/17/79	56	Ducks	9 adults, 56 young	S9, T21N, R19E
10/29/79	300+	"		S32, T19N, R20E
11/ 5/79	400+	"		" " "
6/17/80	29	Ducks	4 adults, 25 young	S23, T24N, R23E
"	19	Geese	6 adults, 13 young	" " "
6/30/80	14	Ducks	3 adults, 11 young	S1, T19N, R22E
7/ 2/80	12	Ducks	2 adults, 10 young	Danvers and vicinity

Appendix Table 8. Observations of bighorn sheep in Little Rocky Mountains, March 1979 - July 1980.

Date	Nos. Obs.	Classification	Location
3/16/79	19	10 ewes (6 lambs, 3 ½-curl rams (one ewe had red neck collar)	SE¼S26, T25N, R24E
"	2	2 ewes (one had red neck collar)	SW¼S29, " R25E
3/30/79	1	ewe (red neck collar)	Sw¼S26, T25N, R24E
"	30	17 ewes, 9 lambs, 4 rams	SW¼S29, " R25E
5/10/79	10	3 rams	SW¼S29, T25N, R25E
"	19		SW¼S29, " "
"	2		NE¼S30, " "
8/10/79	24	numerous lambs	SE¼S26, T25N, R24E
"	2	ewe, lamb	NW¼S36
9/11/79	1	ewe	SW¼S26, T25N, R24E
"	2	ewe, lamb	NE¼S35, " "
12/13/79	15	4 ewes, 3 lambs, 2-½ curl rams, (6 unclassified)	SE¼S26, T25N, R24E
"	2	ewe, ½ curl ram	SW¼S30, T25N, R25E
"	4	2 ewes, 1 lamb, ¼ curl ram	NE¼S29, " "
"	10	5 ewes, 2 lambs, 2-¼ curl ram, 1 1/2-3/4 curl ram (one ewe had yellow and red neck collar)	SE¼S27, T25N, R24E
"	1	yearling ram	SE¼S25, T25N, R24E
1/ 7/80	18		NE¼S35, T25N, R24E
"	12		" " "
1/15/80	32	9 rams	SE¼S26, T25N, R24E
5/17/80	1	½ curl ram	NE¼S30, T25N, R25E
"	23	15 ewes, 8 lambs	NE¼S35, T25N, R24E

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FW-3-R-9
1-b + 1-c Upland Game Birds, Big Game

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MONTANA DEPARTMENT OF FISH, WILDLIFE & PARKS
ECOLOGICAL SERVICES DIVISION

Job Progress Report

State: Montana

Title: Middle Missouri River Planning Project

Project No.: FW-3-R-9

Job No.: 1-b & 1-c - Upland Game Birds, Big Game

Period Covered: July 1, 1980 through June 30, 1981

ABSTRACT

Yearlong observations of mule deer *(Odocoileus hemionus)*, white-tailed deer *(Odocoileus virginianus)*, antelope *(Antilocapra americana)*, elk *(Cervus canadensis)*, and bighorn sheep *(Ovis canadensis)* are presented. Mule deer and antelope classifications were made. Mule deer and bighorn sheep winter range data are presented. Yearlong observations of sage grouse *(Centrocercus urophasianus)*, sharp-tailed grouse *(Pediocetes phasianellus)*, Hungarian partridge *(Perdix perdix)* and ring-necked pheasants *(Phasianus colchicus)* are presented. Known sharp-tailed grouse dancing grounds were surveyed. Forty-two previously unknown sharptail and sage grouse breeding grounds were located. A spring pheasant crowing count was run along Dog Creek. Data were collected on Canada geese *(Branta canadensis)* by spring nest and production surveys on the Missouri River between Holter Dam and Great Falls. Big game and upland game bird harvest and reproduction data are discussed.

OBJECTIVES

The objectives of the project are to determine the extent and location of wildlife habitat, to ascertain the status, distribution, composition and critical use areas (such as winter ranges) of the wildlife present, and to obtain information on breeding populations, productivity and hunter utilization. In conjunction with these objectives, specific problems affecting wildlife are to be delineated and possible solutions to these problems are to be formulated.

TECHNIQUES

Wildlife observations were made from the ground by vehicle and afoot and from the air by using a fixed-wing supercub aircraft. Binoculars and spotting scope were used as an aid for wildlife observations and classifications. Sage grouse and sharp-tailed grouse breeding grounds were located and surveyed during spring. A supercub aircraft was used to find and survey grouse breeding grounds by flying slowly and at a low altitude over potential ground sites during the period between sunrise and about 3 hours after sunrise.

To determine pheasant densities, a 16-mile long crowing count route with 17 stops, each 1 mile apart, was set up. The observer pauses at each stop, records the number of pheasant crows heard during a 2-minute interval, and then moves on to the next stop as quickly as possible and repeats the procedure.

Game bird production data were gathered by random observations of broods along routes.

Spring Canada goose breeding population surveys were made by floating the Missouri River in a canoe. Canada goose nests were located by stopping at each island and searching the island on foot.

STUDY AREA DESCRIPTION

The study area is located in central Montana. It is composed of several separate segments which will be designated as the Little Rocky Mountains segment, the middle segment, southern segment and the upper Missouri River segment (Figure 1). The study area is also divided into several hunting districts (Appendix Figure 1).

The physiography, climate, soils, vegetation and land use were described previously in Job Progress Report, Middle Missouri River Project, FW-3-R-8, Jobs 1-b and 1-c, July 1, 1979 through June 30, 1980.

FINDINGS - MIDDLE AND SOUTHERN SEGMENTS

Mule Deer

For the second consecutive winter, no distinct winter ranges were delineated, as the extremely mild weather permitted mule deer to distribute themselves throughout their home range. Mule deer observations are presented in Appendix Table 1. During the winter period January through March, classification of 754 mule deer was made, with a resulting fawn-adult ratio of 75 fawns per 100 adults (Table 1). This overall figure is slightly lower than the 80/100 ratio obtained last winter; however, it still remains far above the ratios obtained between 1975-78. By consulting Table 2, it can be seen that the fawn-adult ratios in Hunting Districts 417 and 426 have continued to remain at the high levels of the previous year, and HD 410 has dropped off from 80/100 in 1979-80 to 61/100 in 1980-81. Generally, fawn production and/or survival are still above average; consequently, the mule deer population is still doing very well.

Robert Varner, Judith Game Range Manager, Montana Department of Fish, Wildlife & Parks, has been surveying deer in HD 418 and 420 for many years, and he has many thousand winter-spring observations. After consulting him, an attempt was made to delineate deer winter ranges in the southern segment of the study area (Figure 2).

Deer harvest figures are obtained from hunter questionnaires and are presented by hunting district in Table 3. The study area is composed of parts of hunting districts 410, 412, 417, 418 and 426. Since the study area has only small parts of HD's 410, 412 and 417, total harvest figures in these areas are not representative of the harvest within the study area. Most of the harvest in HD's 426 and 418 probably takes place on the study area portion of these two hunting districts; therefore, it is more representative. With this in mind, the most important facts relevant to the study that can be obtained from Table 3 are the general trends. Overall, the trend is rising for harvest with two districts down, but three up. The total harvest was up 20.2% over last year. Hunter numbers are overall down 14.7% from last year, with two districts down and three up. Success is up very significantly in all hunting districts. For the second consecutive year, these trends correlate with the obvious increase of the mule deer population.

Table 1. Mule deer winter classification by hunting district, 1980-81 winter.

Hunting District	Nos. Classified	Classification		Fawn/Adult Ratio
		Adults	Fawns	
410	87	54	33	61/100
412	78	43	35	81/100
417	296	170	126	74/100
418	20	11	9	82/100
426	273	153	120	78/100
Grand Totals	754	431	323	75/100

Table 2. Mule deer winter classification by hunting district, 1975-76 winter; 1980-81 winter.

Hunting District	Winter Date	Nos. Classified	Classification		Fawn/Adult Ratio
			Adults	Fawns	
410	1975-76	82	64	18	28/100
	1976-77	160	122	38	31/100
	1977-78	301	239	62	26/100
	1978-79	501*	278	223	80/100
	1979-80	279	155	124	80/100
	1980-81	87	54	33	61/100
417	1976-77	138	83	55	66/100
	1977-78	176	119	57	48/100
	1978-79	48	32	16	50/100
	1979-80	106	61	45	74/100
	1980-81	296	170	126	74/100
426	1975-76	1,271	920	351	38/100
	1976-77	376	256	120	47/100
	1977-78	67	47	20	43/100
	1978-79	263	151	112	74/100
	1979-80	271	148	123	83/100
	1980-81	273	153	120	78/100

*Classification by Ken Hamlin, Montana Department of Fish, Wildlife & Parks.

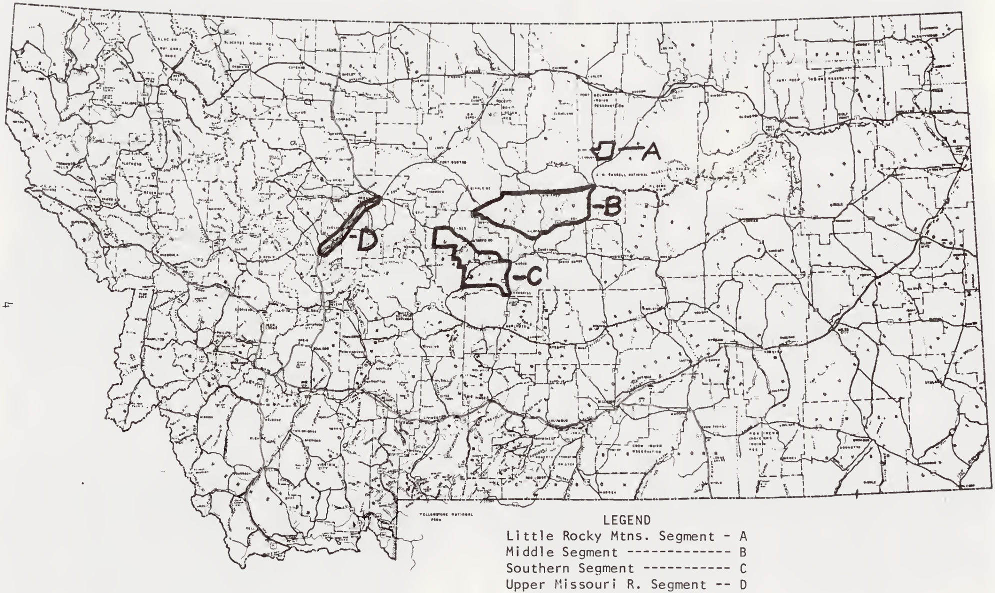

A
B
C
D
YELLOWSTONE NATIONAL PARK
LEGEND
Little Rocky Mtns. Segment - A
Middle Segment ------------- B
Southern Segment ----------- C
Upper Missouri R. Segment -- D

Figure 1. Study area in Montana.

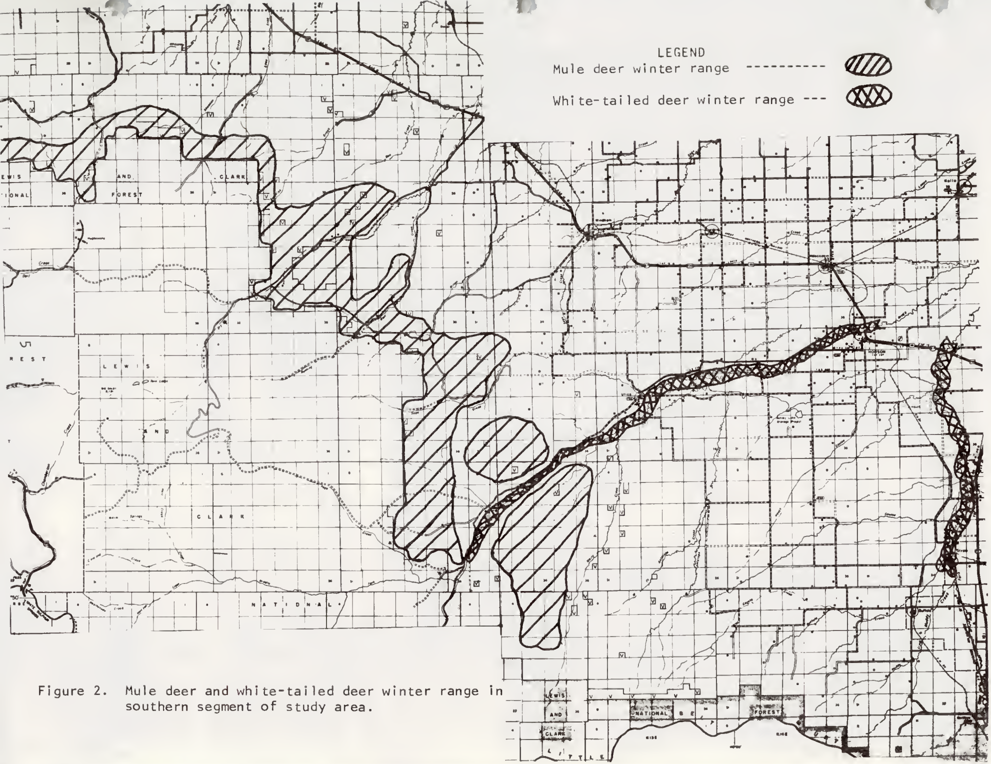

LEGEND
Mule deer winter range ---------- ▨
White-tailed deer winter range --- ▩
LEWIS AND CLARK NATIONAL FOREST
LEWIS AND CLARK NATIONAL FOREST
LEWIS AND CLARK NATIONAL FOREST
HOBSON
Utica
Crook

Figure 2. Mule deer and white-tailed deer winter range in southern segment of study area.

Table 3. Total deer harvest from hunter questionnaires, 1977-1980.

Hunting District	Year	Hunters (Point)	Harvest (Point)	Percent Success	Hunter Days
410	1977	1,120	266	24	3,585
	1978	932	200	21	2,633
	1979	1,625	744	46	4,763
	1980	1,154	687	60	3,375
412	1977	1,699	839	49	6,266
	1978	1,493	566	38	5,134
	1979	2,245	955	43	8,955
	1980	554	395	71	1,489
417	1977	1,324	625	47	4,237
	1978	1,235	487	39	3,339
	1979	1,534	590	38	4,647
	1980	809	1,130	62	4,365
418	1977	1,810	592	33	8,448
	1978	1,200	367	31	4,564
	1979	1,716	414	24	7,285
	1980	1,787	695	39	6,664
426	1977	1,103	562	51	3,917
	1978	1,055	558	53	3,324
	1979	1,363	740	54	3,999
	1980	1,932	1,231	64	4,947

White-tailed Deer

Again, few white-tailed deer observations were made last winter due to the extremely mild winter which did not concentrate them (Appendix Table 1). Only 70 whitetails were classified and their fawn/adult ratio was 71 fawns per 100 adults, up significantly from the 51/100 ratio of last winter. Major white-tailed deer winter range in HD 418 is delineated in Figure 2. It is restricted to the Judith River and its tributary, Ross Fork Creek.

Whitetail harvest in the middle and southern segments of the study area is very small compared to the mule deer harvest.

Antelope

A summer survey of antelope was completed in the southern segment of the study area (Antelope Hunting District 430). During the July 17 and 18, 1981 aerial survey, a total of 640 antelope was observed. They were classified as 314 does, 232 fawns and 94 bucks, which resulted in a fawn/doe ratio of 74 fawns per 100 does. These antelope observations are plotted in Figure 3 and listed in Appendix Table 2. Antelope surveys in HD 430 in past years have been made in 1972 (748 antelope), 1975 (616 antelope) and 1978 (570 antelope). The 1981 total of 640 indicates that antelope numbers are rising slowly after declining from the 1972 count.

Since the 1979-80 winter was so mild, it was not possible to delineate and define winter ranges. Some 112 antelope were observed during the winter (Appendix Table 2); however, these wintering sites are probably very different from sites used during normal or severe winters.

The study area consists of portions of antelope hunting districts 471 and 480 and nearly all of HD 430; therefore, harvest figures for HD 430 are the only ones relevant to the study. The number of permits, harvest and hunter success have varied considerably in HD 430 in the past 4 years (Table 4).

Table 4. Antelope harvest from hunter questionnaires, 1977-1980.

Year	No. of Permits	Harvest	Percent Success
1977	250	135	54
1978	100	69	69
1979	150	81	58
1980	227	128	64

Elk

Bob Varner, Judith Game Range Manager, makes all the elk surveys in the southern segment of the study area, and during his 1980-81 winter surveys he observed up to 239 elk wintering outside the national forest in the Tepee Butte-Reed Hill area and another 144 elk wintering between Little Otter Creek and Dry Wolf Creek, also outside the national forest boundary. An attempt will be made to delineate these elk winter ranges in the future.

As previously reported, the Reed Hill-Tepee Butte area is a major elk calving ground. Additional work will be done delineating this ground and any other elk calving grounds that may be outside the national forest boundary (inside the study area).

Other Mammals - Beaver

Beaver cache counts were made on the Judith River (Table 5). The 1980 count of 52 caches appears to indicate that the beaver population has recovered from the adverse effects of the severe winters of 1977-78 and 1978-79.

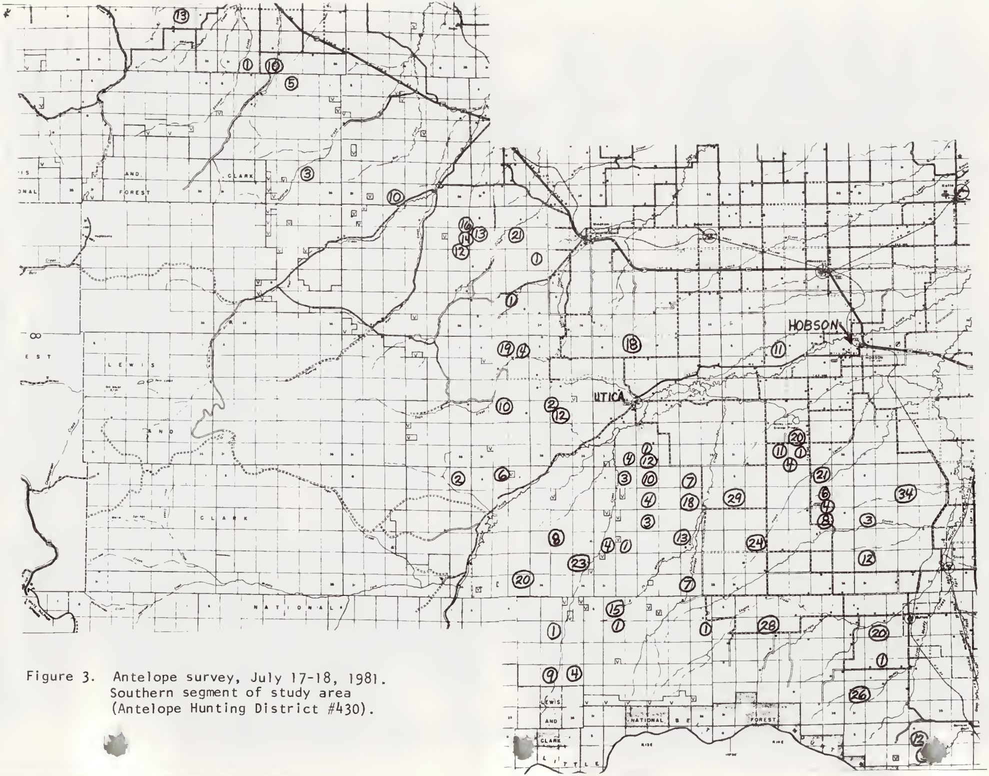


Figure 3. Antelope survey, July 17-18, 1981. Southern segment of study area (Antelope Hunting District #430).

Table 5. Beaver cache counts - Judith River, 1974-1980.

Location	1974	1976	1977	1978	1979	1980
Hobson-Spring Creek	12	21	29	16	19	20
Spring Creek - Warm Springs Creek	2	4	9	10	7	9
Warm Springs Creek - Dry Wolf Creek	9	11	11	9	4	11
Dry Wolf Creek - Mouth	6	5	5	7	6	12
Totals	29	41	54	42	36	52

Sharp-tailed Grouse

Most of the work on sharptails has been done on the middle segment of the study area during the spring season (Appendix Table 3). An intensive effort was made during the 1981 spring to locate previously unknown sharptail dancing grounds. Thirty-three new grounds were located. This successful effort was accomplished entirely by flying low over potential dancing ground sites in a supercub aircraft between sunrise and 3 hours after sunrise. A total of 53 new sharptail grounds has now been found in two springs (Table 6 and Figure 4).

During the 1981 spring, male grouse were counted on 42 previously known dancing grounds on and adjacent to the middle segment of the study area (Tables 6 and 7). A comparison of comparable data obtained from the known grounds in 1981 was made with 1980 and 1979 data. In the area bounded by a line from Winifred west to Arrow Creek, then down Arrow Creek to the Missouri River, then down the Missouri River to the Stafford Ferry crossing, then directly south to Winifred, 19 grounds were comparable between 1981 and 1980 and 17 grounds were comparable between 1981 and 1979. These data showed that total numbers of male sharptails observed in 1981 were down 36% from 1980 and down 21% from 1979. In the area around the North Moccasin Mountains, nine grounds were compared between 1981 and 1980. These comparisons indicated that total numbers of male sharptails observed in 1981 were down 38% from 1980. When combining the data from 32 comparable grounds in both areas, between 1981 and 1980, the result was that the male sharptail population showed a 35% drop between 1981 and 1980.

Sharptail production ratios computed from the fall wing analyses for 1980 were 140 juveniles per 100 adults in Fergus County and 171 juveniles per 100 adults in Judith Basin County. These ratios are down significantly from the Region 4's 22 year average of 220 ju/100 ad.

Because of the extremely mild winter, sharptails remained scattered; thus no winter concentrations were observed.

Harvest figures, obtained from hunter questionnaires, for 1980 indicated a harvest of 7,822 sharptails in Fergus County and 2,298 in Judith Basin County. This compares to the 1979 harvest of 9,789 and 2,506 in Fergus and Judith Basin counties, respectively. Checking stations and field checks also verified that the sharptail harvest was down.

Table 6. Maximum numbers of male sharp-tailed grouse observed on newly found dancing grounds, middle segment of study area, 1979-1981 springs.

Ground Designation and Location[1]		Year 1979	Year 1980	Year 1981
West of Judith River				
A 1	NW¼ S12, T18N, R15E			22[2]
A 2	N½S27, T18N, R14E	21	22	16
A 3	S½S18, " "	15	14	12
A 4	NW¼S5, " R15E			14
A 5	W½S13, T20N, R14E			9
A 6	NW¼S25, " "			8
A 7	SE¼S25, " "			3
A 8	Center of S36, T20N, R14E			21
A 9	SE¼S32, T20N, R15E			4
A 10	NW¼S34, " "		19	18
A 11	SE¼S15, T19N, "			7
A 12	SE¼S11, " "			9
A 13	NW¼S18, " R16E			18
A 14	SW¼S 1, " R15E			10
A 15	NE¼S36, T20N "			10
A 16	SW¼S3, T19N, R16E			24
A 17	SW¼S26, T20N, "			10
A 18	SW¼S13, " "			10
A 19	NE¼S31, " R17E			9
A 20	SW¼S1, T19N, R16E			22
Judith River east to St. Highway 236				
B 1	SW¼S34, T18N, R16E		8	0*
B 2	SW¼S 9, " "		6	0*
B 3	N½S30, " R17E		28	14
B 4	SE¼S7, " "		15	8
B 5	NE¼S17, T18N, R17E			21
B 6	SW¼S 4, " "		32	13
B 7	S32, T19N, R17E		13	1
B 8	S19, " "		27	0*
B 9	S28, " "		2	0
B 10	E½S35, " "		10	7
B 11	E½S27, " "		26	8
B 12	NE¼S27, T20N, R17E			2
B 13	SE¼S12, " "			14
B 14	NW¼S23, " R18E		23	19
B 15	NE¼S27, " "			26
B 16	SE¼S16, T19N, "		18	NC[3]
B 17	SE¼S29, " "		17	15

Table 6 continued.

Ground Designation and Location		1979	1980	1981
		Year		
B 18	NE¼S5, T18N, R18E		15	12
B 19	NE¼S36, T19N, "		16	17
B 20	NW¼S1, T18N, "			20
B 21	SW¼S3, " "			9
B 22	SW¼S10, " "			17
B 23	E½S14, " "			14
B 24	S3, T17N, R18E		1	35
State Highway 236 east to Armells Creek				
C 1	NE¼S18, T18N, R19E			29
C 2	NW¼S2, " "			9
C 3	NW¼S26, T19N, "			5
C 4	SW¼S25, " "			15
C 5	SE¼S20, " R20E			17
C 6	NE¼S21, " "			20
C 7	SE¼S27, T20N, R19E			4
Armells Creek east to US Highway 191				
D 1	S34, T19N, R21E		6	NC
D 2	SE¼S13, T20N, R21E			4
D 3	S8, " R23E		27	NC
D 4	SW¼S20, " "		12	

1 - See Figure 4 for plotted locations.
2 - Underlined in year ground was first found and counted.
* - Surveyed too late in morning; probably missed birds.
3 - NC = Not Counted

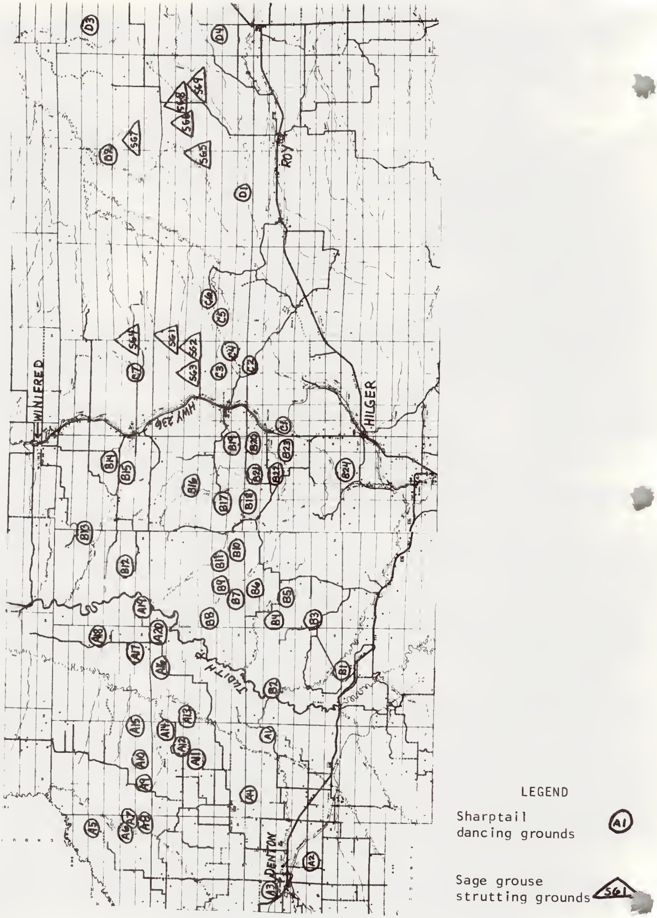


Figure 4. Sharp-tailed grouse and sage grouse breeding grounds. Middle segment of study area.

Table 7. Maximum numbers of male sharp-tailed grouse observed on breeding grounds, springs 1976-1981.

Ground Designation and Location		Year					
		1976	1977	1978	1979	1980	1981
A	S15, T20N, R15E	30[1]	NC[2]	42	49	29	11
B	S24, " "	16	NC	NC	NC	27	6
C	S16, " R16E	14	NC	14	17	14	9
D	S 5, " "	16	NC	12	16	34	14[3]
F	E½S34, T22N, R15E	18	NC	5	14	27	19
G	SE¼S24, " "	10	NC	0	8	19	14
H	E½S32, " "	31	NC	NC	2	30	12
I	NW¼S18, " R16E	12	NC	NC	0	7	0
J	SE¼S9, " R17E	24	22	NC	17	15	NC[4]
K	NE¼S6, T21N, R18E		13	NC	13	0	10
L	SW¼S27, T22N, "		3	NC	6	NC	0
N	NE¼S2, T21N, R17E		18	15	8	7	8
P	NE¼S33, T22N, R17E		18	11	13	3	5
R	NE¼S7, " "		3	NC	1	0	NC
S	SW¼S15, T21N, R18E		18	15	7	14	14
V	SE¼S3, T20N, R15E			19	18	8	7
W	SE¼S12, T22N, R16E			28	6	0	7
X	NE¼S21, T21N, R15E			8	11	20	20
Y	SW¼S14, " "			5	10	16	12
Z	SW¼S18, " R16E			3	3	1	0
CC	NE¼S31, T21N, R18E				22	19	25
DD	S16, T22N, R17E				11	5	2
EE	S18, T21N, R16E				15	20	12
FF	SW¼S21, T20N, R18E				14	16	13
GG	SE¼S1, T21N, R15E				11	19	13
HH	SW¼S36, T22N, "					17	12

1 - Underlined in year ground first found and counted.
2 - Not counted.
3 - Ground plowed up in spring 1980 before census.
4 - Ground moved east 150 yards.

Sage Grouse

During the 1980 summer, three sage grouse broods were observed (Appendix Table 4). They averaged 8.0 young per brood. Sage grouse production ratios computed from the fall wing analyses were 178 juveniles per 100 adults. The 1979 ratio was 318 juveniles per 100 adults. The 17-year average is 193/100 ad so it appears that 1980 was below average production.

The extremely mild winter allowed the sage grouse to remain scattered; thus no winter ranges were delineated for the second consecutive year. The 1980 harvest figures, obtained from hunter questionnaires state that 3,801 sage grouse were harvested in Fergus County. In 1979, in Fergus County, 6,242 were harvested.

During the 1981 spring, nine previously unknown sage grouse strutting grounds were located (Figure 4 and Table 8). These grounds were also found by aerial surveys. Additional effort will be expended in the future on surveying and locating sage grouse strutting grounds.

Table 8. Maximum numbers of male sage grouse observed on newly discovered strutting grounds, spring 1981.

Ground Designation and Location[1]		Year 1981
SG 1	NW¼S7, T19N, R20E	2*
SG 2	NW¼S13, " R19E	10
SG 3	NW¼S14 " "	2*
SG 4	SE¼S25, T20N, "	19
SG 5	SE¼S13, T19N, R21E	5
SG 6	SE¼S8, " R22E	36
SG 7	NE¼S30, T20N, "	3*
SG 8	NE¼S 9, T19N, "	12
SG 9	NW¼S14, " "	22

1 - See Figure 4 for plotted locations.
* - Needs further inventory to make sure it is a permanent ground.

The land use practice of breaking up sagebrush-grassland and seeding it to crops or hay or grass continues steadily. Sagebrush and its associated sage grouse and other wildlife are being threatened with slow eradication.

Pheasants

Surveys of pheasants continued throughout the report period (Appendix Table 5). Pheasant winter (1980-81) sex ratios were made from 169 pheasant observations in Fergus County. A ratio of 1.14 females per male was recorded. This ratio is lower than the ratio of 1.75 females per male recorded during the 1979-80 winter.

The 1980 harvest figures, obtained from the hunter questionnaires, show that the pheasant harvest in Fergus County was 12,470, and in Judith Basin County, 2,635. In 1979, the harvest was 12,639 in Fergus and 2,013 in Judith Basin. Pheasant hunting has been very good during the last 2 years and hunters are finding many birds.

Hungarian Partridge

Huns are the most widely distributed game bird on the study area; however, the two severe winters of 1977-78 and 1978-79 devastated the Hun population which had been at a very high peak prior to those winters. Huns are seldom observed now, and it appears that the mild winter of 1979-80 did not help them recover significantly. The 1980 Hun production ratios taken from the fall wing analyses were 318 juveniles per 100 adults in Fergus County. This ratio was below the 18-year average. During the 1980 hunting season, checking stations and numerous field checks found very few Huns observed and harvested.

Waterfowl

Drought conditions existed from the 1980 summer to May 1, 1981. The result was that many ponds and reservoirs dried up or dropped to very low levels; consequently, little breeding or nesting habitat was available for returning ducks and geese in the spring of 1981. In May 1981, conditions turned around and extremely heavy precipitation filled the ponds and reservoirs and even low areas which are normally dry. Ducks arrived immediately; however, it may have been too late to be of much assistance to waterfowl production.

In July 1980, 10 duck broods were observed, and they averaged 5.2 young per brood. This is similar to averages obtained in past years. No data were obtained on duck production in 1981, as the field work was finished in early June. In 1980, four Canada goose broods were observed, and they averaged 4.8 young per brood. In 1981, two broods were observed and they averaged 5.0 young per brood (Appendix Table 6).

FINDINGS - LITTLE ROCKY MOUNTAINS SEGMENT

Bighorn Sheep

Surveys of bighorn sheep in the Little Rocky Mountains continued during the report period (Appendix Table 7).

Aerial surveys were made in August and December 1980, and February and April 1981. All bighorn observations during these flights were on the winter range. These observations substantiate the theory that, for most of the bighorns, their yearlong home range is identical to their winter range. Only the rams move off the winter range and summer elsewhere. Observations in April 1981 found that the bighorns were wintering in areas adjacent to the previously delineated winter range. These new areas were added to the existing winter range and plotted in Figure 5. Continued attempts will be made to identify the rams' summer range.

This bighorn population appears to be increasing. In 1979-80, this herd was approximately 35 sheep; now it appears to be about 45. During the March 1979-May 1980 surveys a high of 17 ewes was observed. In August 1980, 26 ewes were observed, which would indicate that most of the lambs observed earlier were recruited into the population.

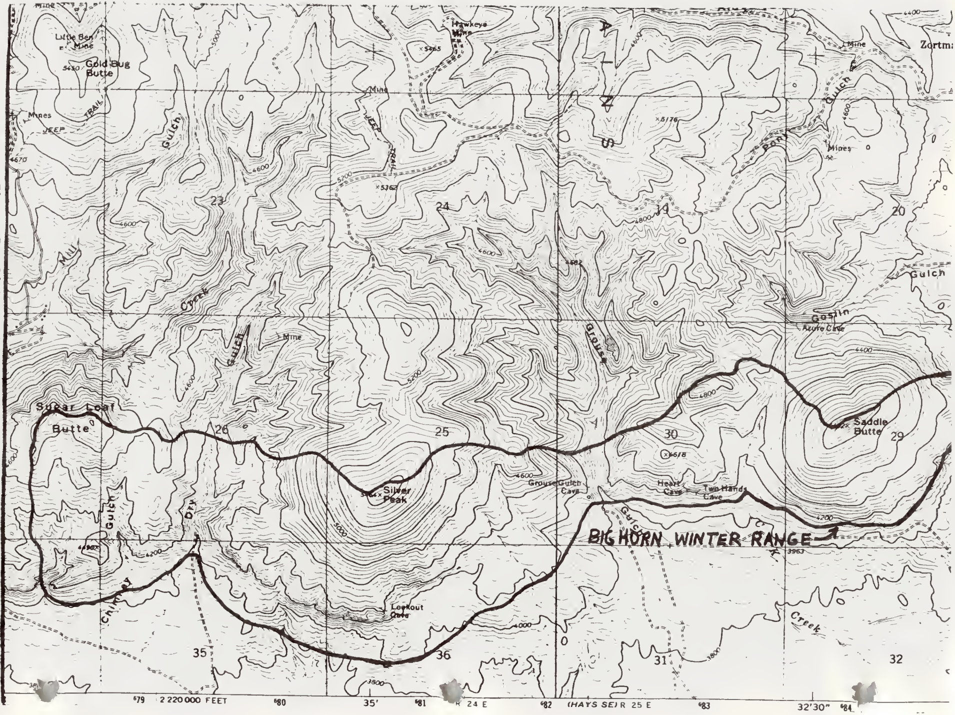


Figure 5. Bighorn sheep winter range, Little Rocky Mtns.

The August classification of 26 ewes probably included some yearling rams which would be difficult to separate from ewes at that time.

Reproduction and/or survival continues to be good, as the 26 ewes observed in August 1980 had 13 lambs, and in February 1981 15 ewes were observed with 8 lambs.

A high total of nine rams, yearlings or older, was observed in 1980, and a high of seven rams was observed in 1981. There was a sheep hunting season in the Little Rocky Mountains for the first time during the fall of 1980. Two permits were issued and two rams harvested.

A description of range conditions and conflicts on the bighorns' winter ramge was given in last year's Job Progress Report, FW-3-R-8, Job No. 1-b and 1-c, title: Middle Missouri River Project.

Other Big Game

Only a few mule deer were observed during the report period, and no winter concentrations of mule deer were observed. Surveys started in March 1979, and since then few mule deer were observed; thus, it appears that the mule deer population in the study area is small. No white-tailed deer or elk have been observed during the entire reporting period.

Upland Game and Nongame

No surveys were made during the report period.

Prepared by: Kerry Constan
July 1981

CANADA GEESE

Breeding Season

During spring 1981, a Canada goose nest and production survey was again conducted on the Missouri River. The river was surveyed from Hardy to Great Falls in 1981. Nest surveys were begun on April 15 when nests were actively being incubated with full clutches. Backdating these nests would place nest initiation at approximately the first week of April. The latest active nest was located May 13, and was approximately 2 weeks into incubation. The latest hatching date would then be around May 27. Most nests were initiated the first week of April, with a peak of hatch occurring the first week of May, similar to 1980 figures.

A breeding population survey was conducted during the nest surveys in 1981. The data from this survey are presented in Table 9. A total of 197 Canada geese was observed on the river from Hardy to Great Falls in 1981, compared to 207 in 1980. These figures showed an active breeding population (pairs and singles) of 114 birds, or 58% of the total 1981 population.

Table 9. Canada goose breeding population survey, 1980 and 1981.

Section	Pairs	Singles	Groups	Total
Hardy to				
1980	21	0	61	103
1981	29	0	11	69
Cascade to				
1980	17	1	48	83
1981	20	0	43	83
Ulm to				
1980	4	4	9	21
1981	8	0	29	45
Great Falls				
Total				
1980	42	5	118	207
1981	57	0	83	197

Fifty-six nests were located in 1981 for the 67 miles of river from Hardy to Great Falls (Figure 6). As in 1980, a majority of the nests (82%) was located in the reach from Hardy to Ulm (Table 10). The river segment for Holter Dam to Hardy was not surveyed in 1981 due to the small number of nests located in this reach in 1980.

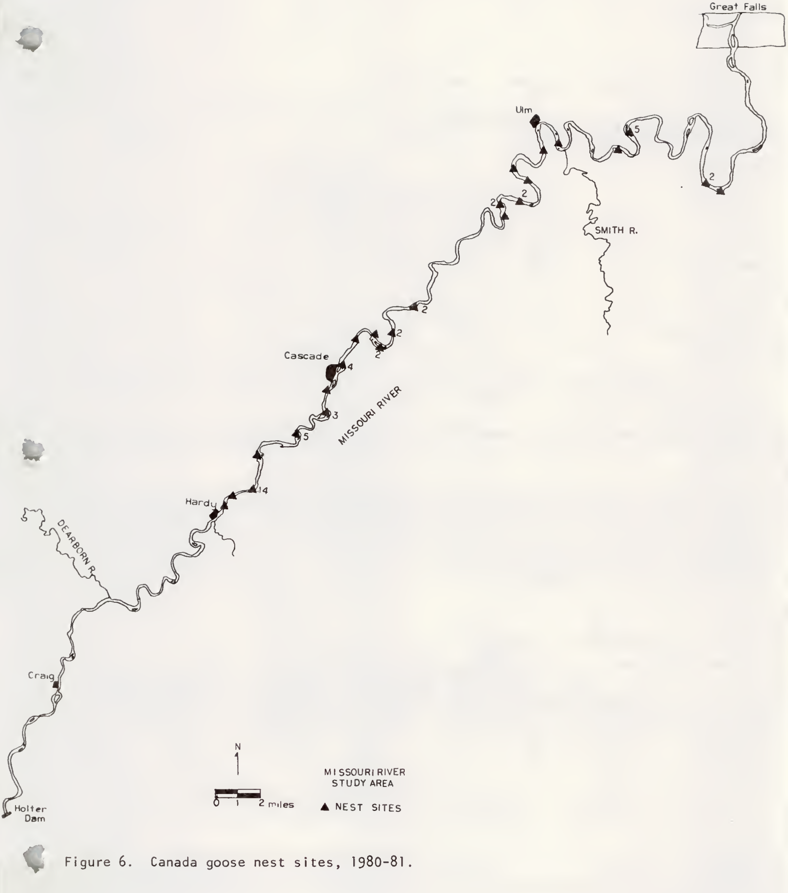


Figure 6. Canada goose nest sites, 1980-81.

Table 10. Canada goose nest surveys 1980 and 1981.

River Section	No. Nests	
	1980	1981
Holter Dam		
to	1	-*
Craig		
to	4	-*
Hardy		
to	20	26
Cascade		
to	21	20
Ulm		
to	7	10
Great Falls		
Total	53	56

*Not surveyed.

Nest fate is presented in Table 11. Due to heavy rains and subsequent flooding in late May, nest fate was only determined for 10 of the 56 nests located in 1981. High river flows and washing out of nest sites precluded follow-up surveys. However, the vast majority of nests hatched prior to flooding, and known fate nest success was similar to 1980 results. It is felt that nest success was similar to 1980 figures, with nest success in the 80% range being reasonable.

Table 11. Canada goose nest fate.

Fate	1980		1981		Known Fate %	
	No. Nests	%	No. Nests	%	No. Nests	%
Hatched	36	68	8	14	85.7	80.0
Deserted	5	9	0	0	11.9	0
Destroyed	1	2	2	4	2.3	20.0
Subtotal	42		10			
Undetermined	11	21	46	82		
Total	53		56			

The desertion and nest destruction rates from 1981 are felt to be biased, due to the small sample size. Field experience and impressions indicate these figures should be similar to the 1980 data.

Egg success (Table 12) was derived from known fate nests. 1981 figures show a 74.5% success rate, compared to 83% in 1980. Again, these figures are probably biased due to the smaller sample size in 1981. Egg fertility was 93% in 1981, versus 94% in 1980.

Table 12. Canada goose egg success (known fate nests).

	1980		1981	
Fate	No.	%	No.	%
Hatched	195	83.0	41	74.5
Deserted	18	7.7	0	0
Destroyed	3	1.3	11	20.0
Infertile	15	6.4	2	3.6
Dead Embryo	4	1.7	1	1.8
Total	235		55	

Average clutch size was again 6.0 eggs for 56 nests. The frequency distribution of clutch sizes is presented in Table 13. A majority of the nests (78.5%) had clutches of from 5-7 eggs, compared to 83% in 1980. The largest nest located in 1981 contained 12 eggs.

Table 13. Frequency distribution clutch size.

	1980		1981	
Clutch Size	No.	%	No.	%
3	4	8.5	4	7.1
4	1	2.1	4	7.1
5	12	25.5	10	17.9
6	13	27.7	19	33.9
7	14	29.8	15	26.8
8	1	2.1	1	1.8
9	1	2.1	2	3.6
10	1	2.1		
11				
12			1	1.8
Total	47		56	

Due to the smaller percentage of nests with known fate, production for 1981 was not calculated. However, production should have been similar or greater than the 248 young estimated in 1980. This is based on similar nest success rates and an actual increase in the number of nests located.

Nest site vegetation and nest material data are presented in Table 14. Willow was again the preferred nest site vegetation, with 62.5% of the nests found in this cover type. Broadleafed forbs was the second highest category at 14.3%. Litter was the predominantly utilized material for nest construction, with 92.5% of the nests composed from it.

Table 14. Nest vegetation and nest material.

Nest Site	1980		1981	
Vegetation	No.	%	No.	%
Willow	35	67.3	35	62.5
Grass	6	11.5	3	5.4
Rosa spp.	3	5.7	4	7.1
Dogwood	1	1.9	0	0
Broadleaf forbs	4	7.7	8	14.3
Litter	3	5.7	6	10.7
Total	52		56	

	1980		1981	
Nest Material	No.	%	No.	%
Litter	45	86.5	52	92.9
Driftwood	5	9.6	-	-
Dogwood	2	3.8	1	1.7
Grass	-		2	3.6
Cattail	-		1	1.7
Total	52		56	

Table 15 presents data on nest site vegetation height, distance of nest sites to water, and height of nest sites above water. Forty-two and nine-tenths percent of the nests were located in vegetation less than 3 feet in height, comparable to the 50% figure in 1980. Sixty-six percent of the nests were within 25 feet of open water, similar to the 1980 figure of 65%. The percentage of nest sites less than 4 feet above the river level at the time of survey was 58.9% in 1981 and 50% in 1980.

Table 7. Nest site vegetation height, distance to water, and height above water.

Vegetation Height	1980		1981	
	No.	%	No.	%
0-1	7	13.5	10	17.9
1-2	13	25.0	9	16.1
2-3	6	11.5	5	8.9
3-4	10	19.2	6	10.7
4-5	2	3.8	3	5.4
5-6	1	1.9	3	5.4
6-7	1	1.9	17	30.4
7-8	0	0	0	0
8-9	2	3.8	0	0
9-10	0	0	1	1.8
10+	10	19.2	2	3.6

Distance to Water	1980		1981	
	No.	%	No.	%
0-5	14	26.9	6	10.7
6-10	7	13.5	13	23.2
11-25	13	25.0	18	32.1
26-50	11	21.2	10	17.9
51-75	3	5.8	5	8.9
76-100	2	3.8	2	3.6
100+	2	3.8	2	3.6

Height above Water	1980		1981	
	No.	%	No.	%
0-1	0	0	0	0
1-2	4	7.7	8	14.3
2-3	10	19.2	18	32.1
3-4	12	23.1	7	12.5
4-5	5	9.6	9	16.1
5-6	5	9.6	7	12.5
6-7	10	19.2	3	5.4
7-8	3	5.8	0	0
8-9	0	0	0	0
9-10	0	0	0	0
10+	3	5.8	4	7.1

As in 1980, all the Canada goose nests located in 1981 were on islands. Table 16 gives a breakdown of number of islands, number of nests, and percent of islands used by river sections. In 1981, 82.1% of all nests located were in the Hardy to Ulm sections, comparable to 78.9% in 1980. This river segment contains 52% of the islands present. The Craig-to-Hardy sections saw an average of 40% of the islands utilized as nest sites, while the Ulm-to-Great Falls section experienced only 20% island utilization.

Information on the number of nests and islands per river mile is presented in Table 17. The average number of islands per mile was 1.2, with a range of 0.8 to 2.4. The average number of nests per mile was 0.7 in 1981 and 0.6 in 1980. In comparing the Hardy-to-Cascade and the Ulm-to-Great Falls sections, it can be seen that the first section has three times as many islands per mile and 6.7 times as many nests per mile as the latter section.

Table 16. No. of Canada goose nests and percent of islands used per river section.

River Section	No. Islands	%	No. Nests	%	Islands Used No.	%
Craig to						
1980	24	24.0	4	7.7	4	16.6
1981	-	-	Not surveyed			
Hardy to						
1980	31	31.0	20	38.5	11	35.4
1981	-	-	26	46.4	15	42.9
Cascade to						
1980	21	21.0	21	40.4	12	57.5
1981	-	-	20	35.7	13	37.1
Ulm to						
1980	24	24.0	7	13.5	5	20.8
1981	-	-	10	17.9	7	20.0
Great Falls						
Total	100		1980 52 1981 56		32 35	

Data on multiple nesting on islands are presented in Table 18. Islands with a single nest accounted for 67.6% of all islands used as nest sites and 41.1% of all the nests. As in 1980, approximately 60% of the nests were located on islands with more than one nest. The area of greatest nest concentration and multiple nesting occurs in an abandoned gravel dredging operation below Hardy. Fourteen nests were located in this area on four islands.

Table 17. Canada goose nests and islands per river mile.

River Section	Miles	Islands/Mile	Nests/Mile	
			1980	1981
Craig to Hardy	14.4	1.7	0.2	Not surveyed
Hardy to Cascade	12.7	2.4	1.6	2.0
Cascade to Ulm	24.5	0.9	0.9	0.8
Ulm to Great Falls	29.8	0.8	0.2	0.3
Total	81.4	Ave. 1.2	Ave. 0.6	0.7

Table 18. Number of islands and nests by frequency of nests/island.

No. of Nests per Island	No./% Islands				No./% Nests			
	1980		1981		1980		1981	
1	21	65.6	23	67.6	21	40.4	23	41.1
2	6	18.8	7	20.6	12	23.1	14	25.0
3	3	9.4	1	2.9	9	17.3	3	5.4
4	1	3.0	1	2.9	1	7.7	4	7.1
5	0	0	0	0	-	-	-	-
6	1	3.0	2	5.8	6	11.5	12	21.4
Total	32		34		52		56	

Instream Flow Analysis

During fall 1980, three islands in the river segment from Hardy to Ulm were selected for WETP analysis for instream flows. Water elevations were recorded under high, intermediate and low flows and side channel cross sections were run for WETP computer analysis. These data are still in the process of being refined, but preliminary results indicate a minimum flow of 3500 cfs is required to maintain adequate flows in the side channels to ensure Canada goose nest success. The complete analysis of these data and presentation of the work will be reported at a later date.

Prepared by: Dan Hook
October 1981

Appendix Table 1. Mule deer and white-tailed deer (as noted) observations, July 1980-June 1981.

Date	Hunt. Unit	No. Obs.	Classification	Location S	T (N)	R (E)
8/20/80	410	2		26	22	19
10/14/80	417	5		15	18	20
10/10/80	417	156	76 D, 72 F, 8 B[1]	11, 12, 13 & 14, T19N, R20E		
10/12/80	426	7		10	18	15
"	"	12		7	"	16
"	417	11(WT)	6 D, 5 F	7	"	19
1/28/81	417	16(WT)	9 A, 7 F	36	19	18
"	412	6(WT)	4 A, 2 F	34	18	18
"	426	14	7 A, 7 F	32	19	"
"	426	5	2 A, 3 F	34	20	"
"	412	2	2 A	21	18	"
"	"	5	3 A, 2 F	27	"	"
"	"	9(WT)	5 A, 4 F	27	"	"
"	"	10	7 A, 3 F	29	"	"
"	"	9(WT)	7 A, 2 F	30	"	"
"	"	3	2 A, 1 F	30	"	"
"	"	4	2 A, 2 F	32	"	"
"	"	4(WT)	1 A, 3 F	4	17	"
"	"	6(WT)	4 A, 2 F	3	"	"
"	"	11	5 A, 6 F	4	"	"
"	"	2	2 F	13	"	17
"	"	3	1 A, 2 F	13	"	"
"	"	9(WT)	5 A, 4 F	14	"	"
"	"	4	2 A, 2 F	13	"	"
"	"	7	4 A, 3 F	36	18	"
"	"	2	1 A, 1 F	35	"	"
"	"	5	3 A, 2 F	23	"	"
"	"	2	1 A, 1 F	18	"	18
"	"	10	5 A, 5 F	20	"	"
"	"	3	2 A, 1 F	30	"	"
"	"	5	3 A, 2 F	20	"	"
"	426	20	12 A, 8 F	23	19	17
"	"	8	5 A, 3 F	15	"	"
"	"	5	4 A, 1 F	15	"	"
"	"	8	5 A, 3 F	29	20	"
"	"	56	29 A, 27 F	32	"	"
"	"	21	10 A, 11 F	6	19	"
"	"	3	1 A, 2 F	14	"	16
"	"	12	9 A, 3 F	3	18	"
"	"	19	12 A, 7 F	4	"	"
"	"	13	8 A, 5 F	9	"	"
"	"	3	1 A, 2 F	27	"	"
"	"	49	32 A, 17 F	3 & 4, T18N, R16E		
"	"	3	1 A, 2 F	6	17	17

Appendix Table 1 continued.

Date	Hunt. Unit	No. Obs.	Classification	Location		
				S	T(N)	R(E)
1/28/81	426	3	1 A, 2 F	6	17	17
2/ 2/81	410	5	4 A, 1 F	9	21	23
"	"	5	4 A, 1 F	10	"	"
"	"	19	10 A, 9 F	21	"	"
"	"	9	7 A, 2 F	29	"	"
"	"	20	12 A, 8 F	8	20	"
"	"	9	5 A, 4 F	1	"	22
"	"	28		10	"	"
"	"	10	6 A, 4 F	16	"	"
2/ 3/81	"	8	5 A, 3 F	27	"	21
"	"	2	1 A, 1 F	33	"	"
"	417	16	10 A, 6 F	4	19	"
"	"	8	4 A, 4 F	9	"	"
"	"	26	14 A, 12 F	9	"	"
"	"	25	13 A, 12 F	17	"	"
"	"	5	2 A, 3 F	8	"	"
"	"	29	20 A, 6 F	17	"	"
"	"	2	2 A	20	"	"
"	"	11	7 A, 4 F	19	"	"
"	"	4	1 A, 3 F	24	"	20
"	"	8	6 A, 2 F	24	"	"
"	"	2	1 A, 1 F	25	"	"
"	"	12	5 A, 7 F	25	"	"
"	"	4	2 A, 2 F	25	"	"
"	"	3	1 A, 2 F	26	"	"
"	"	23	11 A, 12 F	28	"	"
"	"	6	3 A, 3 F	32	"	"
"	"	16	11 A, 5 F	15	18	19
"	"	5	2 A, 3 F	27	"	"
"	"	11	7 A, 4 F	34	"	"
2/11/81	426	4	3 A, 1 F	4	19	16
"	"	4	1 A, 3 F	25	"	15
"	"	8	3 A, 5 F	14	18	14
2/25/81	417	10		31	19	20
"	"	3		31	"	"
"	"	7	3 A, 4 F	31	"	"
"	"	4	2 A, 2 F	31	"	"
"	"	22	13 A, 9 F	31	"	"
"	"	17	10 A, 7 F	14	"	"
"	"	4	2 A, 2 F	14	"	"
"	"	26	15 A, 11 F	35	"	"
3/4/81	426	14	6 A, 8 F	31	18	16
3/11/81	"	4	2 A, 2 F	5	17	17
4/3/81	410	37		31	20	22
4/16/81	418	20	11 A, 9 F	S24 & 26, T9N, R16E		

1 - D = does, F = fawns, B = bucks, A = adults

Appendix Table 2. Antelope Observations July 1980 - June 1981.

Date	No. Obs.	Classification	Location S	T(N)	R(E)
7-17-80	3	1 D, 2 F[1/]	10	11	15
"	12	8 D, 3 F, 1 B	3	"	"
"	34	17 D, 16 F, 1 B	9	13	"
"	1	B	20	12	"
"	20	10 D, 10 F	8	"	"
"	3	2 D, 1 B	18	13	"
"	12	5 D, 6 F, 1 B	30	"	"
"	26	11 D, 14 F, 1 B	"	12	"
"	8	1 D, 7 B	14	13	14
"	4	2 D, 2 F	11	"	"
"	6	4 D, 2 F	"	"	"
"	21	10 D, 8 F, 3 B	2	"	"
"	1	1 D	34	14	"
"	11	5 D, 5 F, 1 B	33	"	"
"	20	9 D, 10 F, 1 B	27	"	"
"	4	2 D, 2 F	34	"	"
"	24	10 D, 13 F, 1 B	20	13	"
"	28	13 D, 14 F, 1 B	9	12	"
"	29	12 D, 16 F, 1 B	7	13	"
"	1	1 B	12	12	13
"	7	3 D, 2 F, 1 B	2	13	"
"	18	9 D, 8 F, 1 B	18	"	"
"	13	9 D, 3 F, 1 B	23	"	"
"	7	3 D, 3 F, 1 B	35	"	"
"	3	3 B	16	"	"
"	4	4 B	9	"	"
"	10	10 B	4	"	"
"	1	1 B	33	14	13
"	4	2 D, 2 F	32	"	"
"	3	1 D, 2 F	5	13	"
"	1	1 B	20	"	"
"	15	8 D, 7 F	5	12	"
"	1	1 B	8	"	"
"	4	1 D, 2 F, 1 B	19	13	"
"	23	18 D, 4 F, 1 B	25	"	12
"	4	3 D, 1 B	24	12	"
"	9	7 D, 1 F, 1 B	23	"	"
"	1	1 D	23	"	"
"	8	6 D, 2 F	23	13	"
"	20	10 D, 9 F, 1 B	33	"	"
"	12	9 D, 2 F, 1 B	33	14	13
7-18-80	18	11 D, 5 F, 2 B	5	"	"
"	1	1 D	3	"	14
"	11	7 D, 4 F	4	"	"
"	12	7 D, 4 F, 1 B	23	"	12
"	2	2 B	23	"	"
"	1	1 D	15	15	"

Appendix Table 2 continued.

Date	No. Obs.	Classification	Location		
			S	T(N)	R(E)
7-18-80	21	9 D, 11 F, 1 B	9	15	12
"	1	1 B	28	"	"
"	19	13 D, 5 F, 1 B	5	14	"
"	4	4 D	4	"	"
"	10	10 B	20	"	"
"	6	1 D 5 B	5	13	"
"	2	1 D, 1 F	1	"	11
"	16	7 D, 9 F	12	15	11
"	14	10 D, 4 F	12	"	"
"	13	8 D, 5 F	7	"	12
"	12	12 B	12	"	11
"	10	4 D, 5 F, 1 B	33	16	"
"	3	3 B	26	"	10
"	5	5 D	3	"	"
"	10	4 D, 5 F, 1 B	33	17	"
"	1	1 B	32	"	"
"	13	8 D, 4 F, 1 B	23	"	9
7-21-80	13	11 D, 2 F	23	20	22
"	12	12 B	5	19	22
"	7	5 D, 2 F	5	"	"
"	2	2 B	32	20	"
1-19-81	28		10	18	18
1-28-81	26		20	"	"
2- 2-81	23		34	20	22
2-11-81	15		3	19	16
2-25-81	20		25	11	19

1 - D = does, F = fawns, B = bucks

Appendix Table 3. Sharp-tailed grouse observations July 1980 - June 1981.

Date	No. Obs.	Classification	Location		
			S	T(N)	R(E)
8-20-80	1		26	22	19
9-17-80	55		32, 33 & 34	20	18
9-22-80	6		1	18	17
10-14-80	15		15	"	20
10-10-80	35		14	19	"
2-11-81	3		14	20	16
4- 3-81	35	35 males on dancing ground	3	17	18
"	29	29 "	NE¼S18	18	19
"	9	9 "	NW¼S 2	"	"
"	15	15 "	SW¼S25	19	"
"	4	4 "	SE¼S13	20	21
4- 8-81	17	17 "	SW¼S10	18	18
"	14	14 "	E½S14	"	"
"	5	5 "	NW¼S26	19	19
"	17	17 "	SE¼S20	"	20
"	20	20 "	NE¼S21	1	"
"	4	4 "	SE¼S27	20	19
"	13	13 "	NW¼S28	11	"
"	19	19 "	NW¼S23	"	18
"	26	26 "	NE¼S27	"	"
"	14	14 "	SE¼S12	"	17
"	2	2 "	NE¼S27	"	"
4-28-81	22	22 "	NW¼S12	18	15
"	10	10 "	SW¼S26	20	16
"	24	24 "	SW¼S 3	19	"
"	22	22 "	SW¼S 1	"	"
"	9	9 "	NE¼S31	20	17
"	10	10 "	SW¼S13	20	16
"	10	10 "	SW¼S 1	19	15
"	9	9 "	SE¼S11	"	"
"	7	7 "	SE¼S15	"	"
"	14	14 "	NW¼S 5	18	"
5- 5-81	16	16 "	NW¼S 5	"	"
"	18	18 "	NW¼S18	19	16
"	10	10 "	NE¼S36	20	15
"	7	7 "	SW¼S 1	19	"
"	14	14 "	SE¼S11	"	"
"	4	4 "	SE¼S32	20	"
"	17	17 "	NW¼S34	"	"
"	3	3 "	SE¼S25	"	14
"	21	21 "	Center of S36	"	"
"	8	8 "	NW¼S25	"	"
"	9	9 "	W½S13	"	"
"	11	11 "	S½S18	18	"
5-11-81	13	13 "	N½S27	"	"

Appendix Table 3 continued.

Date	No. Obs.	Classification	Location		
			S	T(N)	R(E)
5-11-81	12	12 males on dancing ground	S½S18	"	"
"	5	5 "	SE¼S32	20	15
"	7	7 "	S15	"	"
"	6	6 "	S24	"	"
"	14	14 "	S 5	"	16
"	7	7 "	SE¼S 3	"	15
"	12	12 "	SW¼S14	21	"
"	11	11 "	S18	"	16
"	10	10	SE¼S 1	"	15
"	17	17 "	E½S34	22	15
"	11	11 "	E½S32	"	"
"	14	14 "	SE¼S24	"	"
5-14-81	14	14 "	SW¼S15	21	18
"	7	7 "	NE¼S 2	"	17
5-18-81	16	16 "	N½S27	18	14
"	18	18 "	NW¼S34	20	15
"	11	11 "	S15	"	"
"	5	5 "	S24	"	"
"	9	9 "	S16	"	16
"	13	13 "	S 5	"	"
"	1	1 "	SE¼S 3	"	15
"	20	20 "	NE¼S21	21	"
"	10	10 "	SW¼S14	"	"
"	12	12 "	S18	"	16
"	13	13 "	SE¼S 1	"	15
"	12	12 "	SW¼S36	22	"
"	19	19 "	E½S34	"	"
"	12	12 "	E½S32	"	"
"	13	13 "	SE¼S24	"	"
"	7	7 "	SE¼S12	"	16
"	2	2 "	S16	"	17
"	5	5 "	NE¼S33	"	"
"	8	8 "	NE¼S 2	21	"
"	10	10 "	NE¼S 6	"	18
"	10	10 "	SW¼S15	"	"
"	25	25 "	NE¼S31	"	"
"	15	15 "	SE¼S12	20	17
"	15	15 "	SE¼S29	19	18
"	12	12 "	NE¼S 5	18	"
"	9	9 "	SW¼S 3	"	"
"	20	20 "	NW¼S 1	"	"
"	17	17 "	NE¼S36	19	"
"	7	7 "	E½S35	"	17
"	8	8 "	E½S27	"	"
"	1	1 "	S32	"	"
"	13	13 "	SW¼S 4	18	"
"	8	8 "	SE¼S 7	"	"

Appendix Table 3 continued.

Date	No. Obs.	Classification	Location		
			S	T(N)	R(E)
5-18-81	14	14 males on dancing ground	N½S30	18	17
"	21	21 "	NE¼S17	"	"

Appendix Table 4. Sage grouse observations July 1980 - June 1981.

Date	No. Obs.	Classification	Location S	T(N)	R(E)
7-21-80	9	hen + 8 young	2	19	23
"	10	hen + 9 young	28	20	23
"	8	hen + 7 young	3	19	22
"	1	hen	10	"	21
10-14-80	75-100		25+36	21	19
3-20-81	29		29+32	11	"
4- 3-81	5	5 males on strutting ground	SE¼S13	19	21
"	36	36 "	SE¼S 8	"	22
"	3	3 "	NE¼S30	20	"
"	12	12 "	NE¼S 9	19	"
"	22	22 "	NW¼S14	"	"
4- 8-81	2	2 "	NW¼S 7	"	20
"	10	10 "	NW¼S13	"	19
"	2	2 "	NW¼S14	"	"
"	19	19 "	SE¼S25	20	"

Appendix Table 5. Pheasant observations, July 1980 - June 1981.

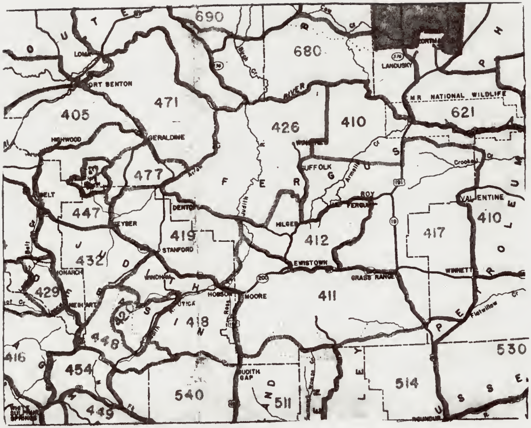
Date	No. Obs.	Classification	Location S	T(N)	R(E)
9-17-80	20		32,33 & 34	20	18
10-14-80	2		15	18	20
10-12-80	100+		9	18	15
12- 9-80	23	19 hens, 4 cocks	Warm Springs Creek		
12-24-80	70	35 hens, 35 cocks	9	18	15
2-11-81	14	10 hens, 4 cocks	30	21	17
"	10	2 hens, 8 cocks	18	17	17
"	10	2 hens, 8 cocks	29	17	18
3- 3-81	29	14 hens, 15 cocks	7	19	14
3- 4-81	13	8 hens, 5 cocks	19	18	15

Appendix Table 6. Waterfowl observations, July 1980 - June 1981.

Date	No. Obs.	Ducks/ Geese	Classification	Location		
				S	T(N)	R(E)
7-21-80	6	Ducks	hen + 5 young	23	20	23
"	56	"	9 hens + 47 young	"	"	22
"	8	Geese	2 adults + 6 young	"	"	"
5-28-81	14	Geese	4 adults + 10 young	"	"	"

Appendix Table 7. Bighorn sheep observations in Little Rocky Mountains, July 1980 - June 1981.

Date	No. Obs.	Classification	Location		
			S	T(N)	R(E)
8-19-80	23	15 E, 7 L, 1 R (½ curl)[1]	SE¼S26	25	24
"	17	11 E, 6 L	NW¼S36	"	"
12-11-80	3		SE¼S26	"	"
2- 3-81	30	15 E, 8 L, 5 A R, 2 Y R	"	"	"
4- 3-81	14		SE¼S27	"	"
"	12	7 R	NW¼S35	"	"
"	2	ewe and lamb	NE¼S29	"	25



Appendix Figure 1. Hunting districts.

FW-3-R-4
b and 1-c (East Segment)

MONTANA DEPARTMENT OF FISH AND GAME
ENVIRONMENT AND INFORMATION DIVISION

JOB PROGRESS REPORT

State Montana
Project No. FW-3-R-4
Job No. 1-b and 1-c (East Segment)
Title Fish and Game Planning, Middle Missouri River - Big Game and Upland Game Bird Inventory - Eastern Segment
Period Covered October 1, 1975 - June 30, 1976

ABSTRACT

Big game found in the area included mule deer, white-tailed deer, antelope and bighorn sheep. Inventories have outlined deer winter ranges. Mule deer classifications and some deer winter range population densities were made. Antelope and bighorn sheep were located. Yearlong locations of observed big game were recorded. Game birds found in the area included sage grouse, sharp-tailed grouse, Hungarian partridge and ring-necked pheasants. Known sage grouse and sharp-tailed grouse breeding grounds were checked. Previously unknown sage grouse and sharp-tailed grouse breeding grounds were located. Highest density pheasant areas were located. This is a highly productive waterfowl production area. A spring survey of Canada geese was made by Hook. (Other birds, predators, furbearers and prairie dogs were discussed.)

OBJECTIVES

The two primary objectives are to determine the status, seasonal distribution, productivity, herd composition and critical use areas, such as big game winter ranges of the big game present and to determine the extent and location of upland game and waterfowl habitat, to obtain information on breeding populations, productivity and hunter utilization and to ascertain the distribution and relative abundance of upland game and waterfowl.

In conjunction with these objectives, specific problems affecting big game, upland game and waterfowl are to be delineated and possible solutions to these problems are to be formulated.

TECHNIQUES

Throughout the year big game and upland game surveys were conducted on the ground by car and on foot and from the air by using a Supercub airplane and helicopter. Binoculars and spotting scope aided game observations and classification. Big game and upland game data were plotted on Bureau of Land Management maps.

Sage grouse and sharp-tailed grouse breeding grounds were primarily located by driving roads and looking and listening during spring. Some grounds were located from a Supercub airplane. Game bird production data were gathered by random observations of broods. A spring Canada goose census was made by floating the Missouri River.

STUDY AREA (EASTERN SEGMENT) DESCRIPTION

Location

The study area is located in northcentral Montana. The eastern segment of the study area follows the Missouri River from the junction of Arrow Creek downstream to the Robinson Bridge, U.S. Highway 191. This segment includes the breaks and uplands along both sides of the river (Figure 1).

The eastern segment includes parts of Fergus, Phillips and Blaine Counties. The only towns of any size in or near the study area are Denton, Winifred and Lewistown.

Physiography and Climate

The study area is a part of the Great Plains dissected by the Missouri River and its tributaries. The Missouri River flows through a relatively deep valley varying from 500-1000 feet below the average elevation of the adjacent plains. The soils are extremely unstable. Erosion and tributary drainage have produced highly dissected, rough terrain, resulting in spectacular, varied, and scenic badlands and breaks ranging from two to ten miles in width immediately adjacent to the river valley along both sides of the Missouri River and of lesser width along tributary streams. This greatly eroded section of the region is commonly known as the Missouri River Breaks (Department of the Interior 1975).

The climate is semi-arid. It is marked by wide seasonal fluctuations in precipitation and temperature, by recurring drought, a relatively short growing season and a high proportion of sunny days. Precipitation averages about 13 inches annually. Summer temperatures are moderate, usually hot in the daytime and cool at night. Fall months are generally open and dry. Very little snow falls before October. The Missouri River is usually frozen over by December and does not thaw until April. Winters are cold, with light to moderate snowfall. Low temperatures are frequently dispelled by moderating winds known as "chinooks" (Department of the Interior 1975).

Soils

The eastern segment of the study area is comprised of five soil associations (Southard 1973). A general description of the soil associations are:

> BA - Badlands; dominantly rough gullied land along major streams, principally the Missouri River Breaks. Small areas of Bainville, Midway, Lismas and Pierre soils are included. The area is used primarily for grazing.

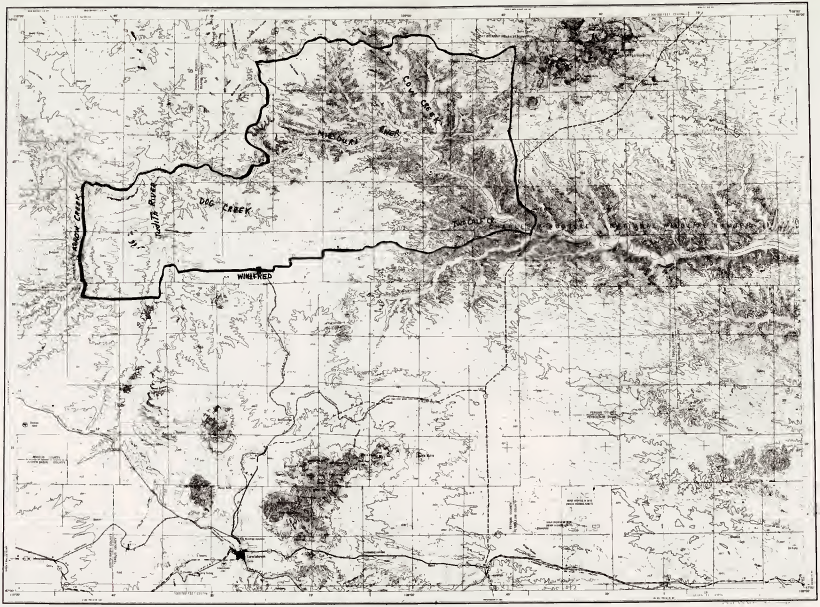


Figure 1. Middle Missouri River study area (eastern segment).

BSV - Bearpaw-Sprole-Vida; these are dark, moderately fine textured soils on continental glacial till. The compact substratum in many places may restrict root and water penetration. Included soils are Landusky, Williams, Zahl, Thoeny, Elliam and Laurel. They are used principally for grain and hay.

DJU - Danvers-Judith-Utica; these are dark, medium-textured soils underlain by gravel. Included soils are Winifred, Teton and Sipple. They are used principally for small grain production.

LP - Lismas-Pierre; these are clay soils over shale. The Pierre soils are deeper than the Lismas soils. They are used mainly for range. Included soils are Vanada and Promise.

SBW - Spring Creek-Blaine-Woodhurst; this association is confined to the Bearpaw Mountains. These soils are associated with the igneous rocks that form the highlands. They are used for range and timber production.

VEGETATION

According to Payne 1973 there are four vegetative rangeland types in the eastern segment of the study area. They are as follows (with brief descriptions):

Teton River-Judith Basin Grassland

This type is found in the southwest corner of the eastern segment of the study area. It is a gently sloping to rolling grassland with large amounts of sandberg bluegrass and prairie junegrass and lesser amounts of bluebunch wheatgrass, needleleaf sedge and threadleaf sedge. Much of the better land has been broken for grain production and is very productive.

Central Grassland

This type is commonly found on the high plains adjacent to the breaks throughout the study area. It is a plains with rolling and rough characteristics. The distinguishing feature is the general prevalence of big sagebrush in minor quantities throughout this type. The sagebrush in local situations assumes dominance in the aspect while in other areas it fades out almost completely. Some other common species are plains prickly pear, silver sagebrush, fringed sagewort, sandberg bluegrass, green needlegrass, bluebunch wheatgrass, phlox, wild buckwheat, scarlet globemallow and sedges.

Missouri Breaks Scrub-Pine

This type is found along the steep breaks and rough and rolling land of the Missouri River and its tributaries throughout this segment of the study area. The distinguishing feature of this type is the wild rugged topography. Cliffs, deep-cut canyons and large rock outcrops are common. A distinguishing grass species is plains muhly. Other common species are ponderosa pine, juniper, sagebrush, rabbitbrush, yucca, plains prickly pear, western wheatgrass, little bluestem, sandberg bluegrass, threadleaf sedge, phlox and wild buckwheat.

Undifferentiated Stream and Lake Bottoms

This type is found along the Missouri River. The distinguishing species are willow and cottonwood. Other common species are rose, big sagebrush, silver sagebrush, rabbitbrush, common snowberry, silver buffaloberry, needle-and-thread, blue grama, saltgrass, lambsquarter goosefoot, sunflower, stickseed and plantain. Much of this type is overgrazed and also a great portion of the best land has been withdrawn for farming.

FINDINGS - BIG GAME

Mule Deer

Mule deer, *Odocoileus hemionus*, are native to the area and are its most important big game animal. Their distribution is widespread as they use all vegetation types to some degree. They are primarily associated with the breaks and adjacent agriculture. Major concentrations are in Arrow Creek, Dry Wolf Creek, Judith River, Two Calf Creek, Armells Creek and Cow Creek drainages.

Most mule deer remain in the same areas yearlong, however, the deer along the Missouri River move up to the heads of the breaks during winter. A combination of persistent snow cover in the bottom of the main Missouri River Canyon and the lighter snow cover, winds and chinooks along the heads of these breaks are the major reasons for this movement.

Plotting of major mule deer winter ranges from observations (Table 1) was started (Figure 3). Two helicopter flights were made to determine numbers, productivity, density and to delineate winter ranges (Tables 3 and 4) (Figures 4 and 5). Highest deer densities were recorded in the Brooks area - 19.5 deer per square mile and Arrow Creek - 14.2 deer per square mile.

Deer productivity has become a critical problem as fawn-adult ratios are very low (Table 2). Highest was Arrow Creek with a ratio of 44 fawns per 100 adults and lowest was Box Elder with 25 fawns per 100 adults. Surveys will continue to monitor productivity and to gather data to try to determine reasons for this low productivity.

Table 2 shows that emphasis was placed on classification of deer in hunting district 426 (Figure 2) with some done in hunting district 410 and little done in hunting district 680. Next winter emphasis will be placed on classification of deer in hunting district 410 and 680.

Analysis of deer classification from December through May indicates that fawn-adult ratios remained about the same throughout the period indicating that the mild winter and or other factors did not appreciably reduce the number of fawns. It appears that the highest fawn survival is in the western part of the study area and that it goes down the farther east you go. This is also verified by even lower fawn survival throughout the Missouri Breaks just east of the study area.

Table 1. Mule deer and white-tailed deer observations, December 1975 - June 30, 1976.

Date	Number Observed	Classification	Drainage and Location
		MULE DEER	
12- 8-75	3		Missouri R., Sec. 23, T23N, R14E
12- 9-75	11		Missouri R., Sec. 23, T23N, R14E
12-23-75	1	doe	Sec. 26, T22N, R17E
12-24-75	3		Coffee Cr.-Arrow Cr., Sec. 3, T20N, R15E
1- 9-76	9	3 bucks, 3 does, 2 fawns	Reed Hill, Sec. 13, T22N, R16E
1-26-76	1	doe	Sheep Past., Sec. 18, T22N, R23E
1-26-76	6	1 buck, 4 does	Middle Two Calf, Sec. 18, T22N, R22E
1-26-76	7	6 does, 1 fawn	Middle Two Calf, Sec. 27, T22N, R22E
1-26-76	5	4 does, 1 fawn	Sec. 32, T23N, R21E
2- 2-76	3		West S. Judith R., Sec. 22, T22N, R16E
2- 2-76	6	4 does, 2 fawns	Dog Cr., Sec. 2, T22N, R17E
2- 2-76	2	1 doe, 1 fawn	S½ Sec. 16, T22N, R18E
2-25-76	12		Big Sag, Sec. 26, T22N, R15E
2-26-76	15	12 adults, 3 fawns	Fargo Coulee, Sec. 19, T21N, R23E
2-26-76	4		Fargo Coulee, Sec. 19, T21N, R23E
2-27-76	9	5 adults, 4 fawns	Sec. 5, T21N, R19E
2-29-76	13	9 adults, 4 fawns	Dog Cr., NE¼ Sec. 17, T21N, R18E
2-29-76	3	2 adults, 1 fawn	Dog Cr., Sec. 33, T22N, R18E
2-29-76	10		Dog Cr., Sec. 33, T22N, R18E
2-29-76	3	2 adults, 1 fawn	Dog Cr., Sec. 33, T22N, R18E
2-29-76	3	2 adults, 1 fawn	Sec. 26, T22N, R18E
2-29-76	13	10 adults, 3 fawns	Dog Cr., SW¼ Sec 15, T22N, R17E
2-29-76	9	7 adults, 2 fawns	Dog Cr., W½ Sec. 1, T22N, R16E
3- 3-76	4		Stafford Rd., Sec 11, T22N, R18E
3- 3-76	6	4 adults, 2 fawns	Sec. 2, T22N, R17E
3- 3-76	7	4 adults, 3 fawns	Dog Cr., Sec. 5, T22N, R17E
3- 3-76	4	3 adults, 1 fawn	Sec. 32, T23N, R17E
3- 3-76	3	3 adults	Sec. 1, T22N, R17E
3- 3-76	6	5 adults, 1 fawn	Sec. 2, T22N, R17E
3- 3-76	6	4 adults, 2 fawns	Sec. 2, T22N, R17E
3- 3-76	8		Sec. 1, T22N, R17E
3- 3-76	7		Sec. 7 & 8, T21N, R19E
3- 3-76	5		Sec. 30 & 31, T23N, R19E
3- 3-76	7	7 adults	N½ Sec. 36, T23N, R18E
3- 3-76	12	9 adults, 3 fawns	Sec. 30, T23N, R19E
3- 3-76	7	7 adults	N½ Sec. 29, T23N, R19E
3- 3-76	4	3 adults, 1 fawn	Sec. 30, T23N, R19E
3- 3-76	16		Sec. 26, T23N, R18E
3- 3-76	3	2 adults, 1 fawn	Sec. 28, T23N, R19E
3- 3-76	2	1 adult, 1 fawn	Sec. 27, T23N, R19E
3- 4-76	322	200 adults, 85 fawns, 37 uncl.	Breaks along west side of Dry Wolf Cr. from Sec. 7 & 8, T19N, R16E, north to junction of Dry Wolf Cr. and Judith R. (see map).

Table 1 (continued). Mule deer and white-tailed deer observations, December 1975 - June 30, 1976.

Date	Number Observed	Classification	Drainage and Location
		MULE DEER	
3- 4-76	455	256 adults, 113 fawns, 86 uncl.	Breaks along east side of Arrow Cr. from Missouri R. to junction of Coffee Cr., and Arrow Cr. plus breaks along east side of Coffee Cr. to south boundary of T20N, R15E & 14E
3- 5-76	212	169 adults, 42 fawns, 1 uncl.	Box Elder Cr. drainage (breaks)
3- 5-76	136	102 adults, 34 fawns	Salt Creek drainage (breaks)
3- 5-76	6	3 adults, 3 fawns	Judith R., Sec. 12, T21N, R16E
3- 5-76	6	4 adults, 2 fawns	Judith R., Sec. 36, T22N, R16E
3- 5-76	6	4 adults, 2 fawns	Judith R., Sec. 26, T22N, R16E
3-12-76	9	6 adults, 3 fawns	Woodhawk Cr., Sec. 26, T23N, R21E
3-12-76	3		Woodhawk Cr., Sec. 26, T23N, R21E
3-17-76	10	7 adults, 3 fawns	Judith R., Sec. 2, T20N, R16E
3-17-76	9	7 adults, 2 fawns	Judith R., Sec. 34, T20N, R16E
3-17-76	8	7 adults, 1 fawn	Judith R., Sec. 24, T21N, R16E
3-22-76	4	3 adults, 1 fawn	Bull Cr., Sec. 7, T23N, R22E
3-22-76	2	2 adults	Sec. 8, T23N, R23E
3-29-76	7	5 adults, 2 fawns	Dog Cr., Sec. 36, T23N, R16E
3-31-76	4	3 adults, 1 fawn	Sec. 12, T22N, R21E
3-31-76	6	4 adults, 2 fawns	Sec. 7, T22N, R22E
3-31-76	4	2 adults, 2 fawns	Sec. 10, T22N, R18E
4- 3-76	10		Sec. 30, T22N, R19E
4- 6-76	3		Sec. 5, T21N, R19E
4- 6-76	14	11 adults, 3 fawns	Sec. 25, T22N, R19E
4- 9-76	10		Sec. 14, T21N, R20E
4- 9-76	7		Sec. 19, T22N, R21E
4- 9-76	3		Sec. 25, R23N, R20E
4-10-76	11		Sec. 16, T24N, R18E
4-10-76	13		Sec. 2, T24N, R18E
4-10-76	4		Sec. 12, T24N, R18E
4-10-76	6		Sec. 13, T24N, R18E
4-10-76	7		Sec. 13, T24N, R18E
4-10-76	23		Sec. 22, T24N, R19E
4-10-76	19		Sec 3, T24N, R19E
4-10-76	3		Sec. 12, T24N, R19E
4-10-76	7		Sec. 12, T24N, R19E
4-10-76	4		Sec. 26, T25N, R19E
4-10-76	7		Sec. 18, T25N, R19E
4-10-76	8		Sec. 13, T25N, R18E
4-10-76	7		Sec. 24, T25N, R18E
4-20-76	7	4 adults, 3 fawns	Sec. 30, T22N, R19E Stafford Ferry
4-30-76	4	4 adults	Sec. 13, T21N, R22E
5- 4-76	5		Sec. 13, T22N, R18E

Table 1 (continued). Mule deer and white-tailed deer observations, December 1975 - June 30, 1976.

Date	Number Observed	Classification	Drainage and Location
		MULE DEER	
5- 6-76	2		Sec. 12, T21N, R15E
5- 6-76	15		Sec. 16, T20N, R15E
5- 7-76	15	11 adults, 4 fawns	Sec. 15, T22N, R19E
5- 7-76	10		Sec. 7, T21N, R16E
5-10-76	4		Sec 17, T20N, R16E
5-10-76	5		Sec. 7, T20N, R16E
5-12-76	1		Sec. 20, T21N, R15E
5-12-76	8		Sec. 23, T20N, R15E
5-13-76	14		Sec. 26, T22N, R15E
5-13-76	3		Sec. 26, T22N, R15E
5-13-76	3		Sec. 32, T22N, R16E
5-13-76	9		Sec. 31, T22N, R16E
5-13-76	4		Sec. 20, T22N, R16E
5-18-76	6		Sec. 22, T22N, R15E
5-18-76	1		Sec. 21, T22N, R15E
5-18-76	2		Sec. 15, T22N, R15E
5-19-76	6		Sec. 32, T22N, R16E
5-19-76	2		Sec. 31, T22N, R16E
		WHITE-TAILED DEER	
12- 8-75	8		Missouri River, Sec. 23, T22N, R23E
12- 9-75	6		Missouri River, Sec. 24, T23N, R14E
2-29-75	5	3 adults, 2 fawns	Dog Cr., Sec. 8, T21N, R18E

Table 2. Mule deer classification by hunting district, December 1975-May 1976.

Hunting District	Method of Survey	Number Classified	Classification Adult	Classification Fawn	Fawn/Adult Ratio
426 General	Ground & Supercub	270	193	77	40/100
426 Arrow Cr. Winter Range	Helicopter	369	256	113	44/100
426 Dry Wolf Cr. Winter Range	Helicopter	285	200	85	43/100
426 Box Elder Cr. Winter Range	Helicopter	211	169	42	25/100
426 Salt Cr. Winter Range	Helicopter	136	102	34	33/100
426 TOTAL DISTRICT		1,271	920	351	38/100
410 General & Total	Ground & Supercub	82	64	18	28/100
GRAND TOTAL FOR STUDY AREA		1,353	984	369	38/100

Table 3. Mule deer surveys - Wolf Creek-Arrow Creek areas of hunting district 426.

Unit	Ad.	Fawn	Uncl.	Total	F/100 Ad.	Area Sq. M.	Deer/Sq. Mile
Arrow Creek	161	61	84	306	37.9	21.5	14.2
Coffee Creek	95	52	2	149	54.7	18.6	8.0
Wolf Creek	200	85	37	322	42.5	60.2	5.4

Table 4. Mule deer surveys - Salt Creek area of hunting district 426.

Unit	Ad.	Fawn	Total	F/100 Ad.	Area Sq. M.	Deer/Sq. M.
Salt Creek	102	34	136	33	22.1	6.2
Brooks	96	23	119	24	6.1	19.5
Box Elder - N	46	13	59	28	4.7	12.6
Box Elder - S	27	6	33	22	5.8	5.7
Total	271	76	347	28	38.7	9.0

Legend

Study area (eastern segment) -

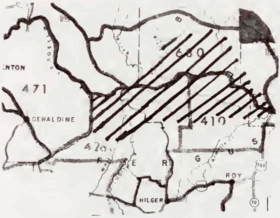


Figure 2. Hunting districts in study area. ▨

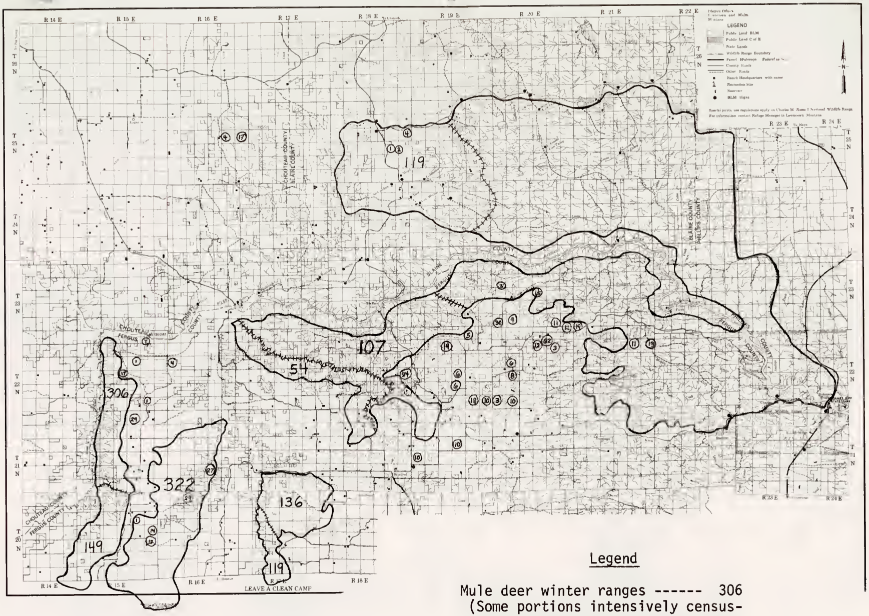
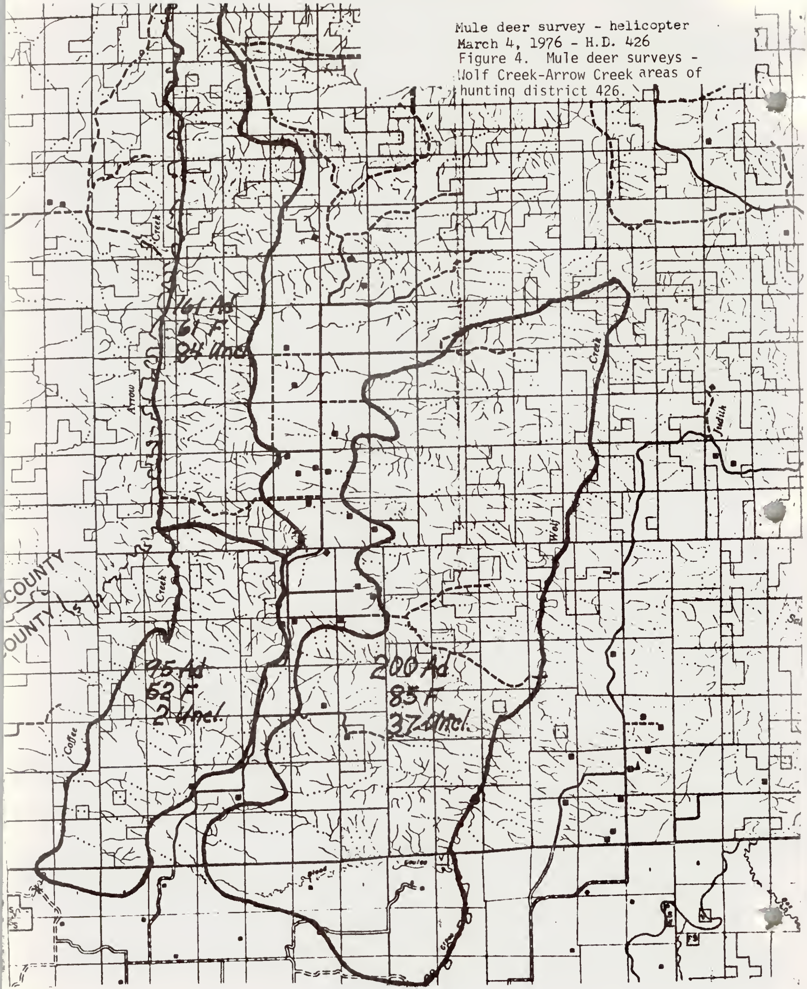


Figure 3. Mule deer winter ranges and antelope observations.

Legend

Mule deer winter ranges ------ 306
(Some portions intensively censused - numbers denote total deer observed.)

Antelope observations December 1975 - June 30, 1976 ---- 45



Mule deer survey - helicopter
March 4, 1976 - H.D. 426
Figure 4. Mule deer surveys - Wolf Creek-Arrow Creek areas of hunting district 426.

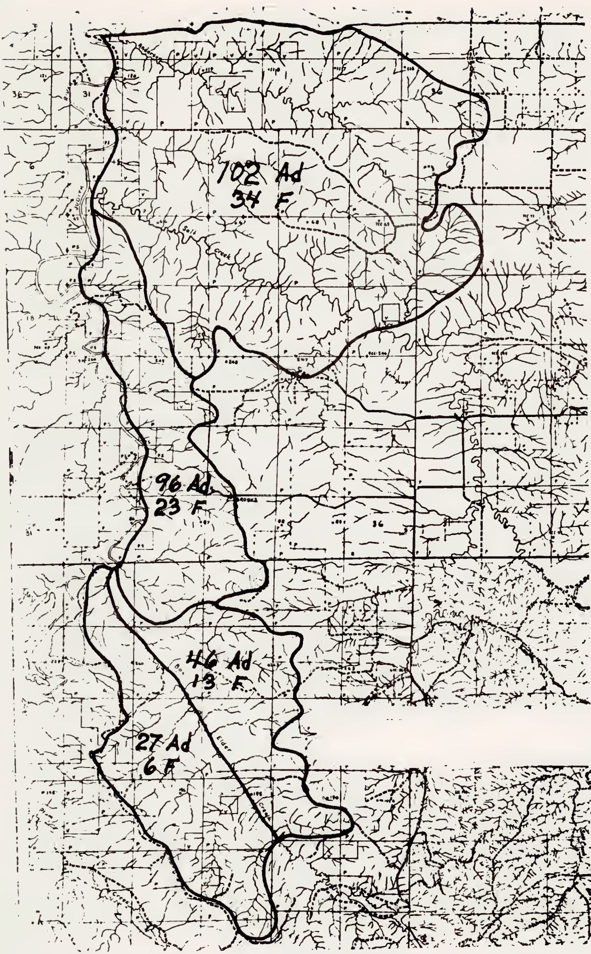


Figure 5. Mule deer surveys - Salt Creek area of hunting district 426.

Future intensive aerial surveys will concentrate on further delineation of all deer winter ranges and determination of wintering deer densities.

White-tailed Deer

White-tailed deer, *Odocoileus virginianus*, are native to this country and they were observed by the Lewis and Clark expedition of 1804-05 (Thwaites 1904). The small population is primarily restricted to the Missouri River bottom where they use islands, timbered bottomlands and adjacent agriculture. A few whitetails are also found short distances up side drainages. An excellent paper by Allen 1968 describes their range use, food habits and productivity in the southeast corner of the study area. White-tailed deer observations are listed in Table 1. Not enough whitetails were observed to determine productivity in the study area.

Antelope

Antelope, *Antilocapra americana*, are native to the area and were observed by the Lewis and Clark expedition of 1804-05 (Thwaites 1904). They are common throughout the sagebrush-grassland-agriculture aspects of the study area and are absent from the timbered areas. They are most plentiful between Arrow Creek and the Judith River where they remain yearlong and in the sagebrush-agriculture complex northeast of Winifred which they primarily use for spring-summer and fall range. The majority of these antelope migrate to the south to winter and numerous antelope were observed migrating back into the study area on March 18, 1976.

Antelope observations are recorded in Table 5 and are plotted in Figure 3. Gjersing, Montana Department of Fish and Game, made a July aerial survey of antelope in hunting district 680, north of the Missouri River (Table 6). He observed 80 antelope (10 bucks, 49 does, 21 fawns). Reproduction ratio was a low 43 fawns per 100 does. Watts, Montana Department of Fish and Game made a July aerial survey of antelope in hunting district 471. The north end of hunting district 471 is in the study area (Figure 6) (Table 7). The unit north of Denton, half of which is in the study area (Table 7) had a total of 236 antelope (20 bucks, 119 does, 97 fawns). Reproduction ratio was 82 fawns per 100 does which was much better than north of the Missouri River.

As more data is collected, antelope winter ranges and summer concentrations will be delineated and plotted.

Bighorn Sheep

The Lewis and Clark expedition of 1804-05 observed many bighorn sheep, *Ovis canadensis*, in the study area (Thwaites 1904). They became extinct by 1916. The Montana Department of Fish and Game released 43 bighorns between 1958 and 1961 into a 1,400 acre fenced enclosure on the Charles M. Russell National Wildlife Range. This enclosure is located in the extreme southeast corner of the study area.

Table 5. Antelope observations, December 1975 - June 30, 1976.

Date	No. Observed	Location
1-26-76	11	N½ Sec. 1, T22N, R20E
1-27-76	29	S½ Sec. 34, T22N, R15E
2-24-76	24	Taffy Cr., Sec. 24, T22N, R18E
2-24-76	19	Two Calf Cr., NW¼ Sec. 6, T22N, R21E
2-27-76	18	Sec. 35, T22N, R19E
2-27-76	1	Sec. 25, T22N, R18E
2-27-76	62	Sec. 2, 3, 10 & 11 T22N, R20E
3- 4-76	14	Dry Wolf Cr., Sec. 13, T20N, R15E
3- 4-76	29	Dry Wolf Cr., Sec. 4, T20N, R16E
3- 4-76	27	Dry Wolf Cr., Sec. 27, T21N, R16E
3- 4-76	17	Arrow Cr., Sec. 16, T22N, R15E
3-18-76	18	Taffy Cr., Sec. 15, T22N, R19E
3-18-76	21	Sec. 9, T22N, R20E
3-18-76	10	Sec. 9, T22N, R20E
3-18-76	43	Sec. 6, T22N, R21E and Sec. 1, T22N, R 20E
3-29-76	10	Sec. 15, T21N, R19E
3-31-76	13	Sec. 12, T22N, R21E
3-31-76	6	Sec. 27, T22N, R19E
3-31-76	6	Sec. 17, T22N, R20E
4- 6-76	14	Sec. 10, T22N, R19E
4- 6-76	10	Sec. 19, T21N, R19E
4- 9-76	3	Sec. 11, T22N, R20E
4- 9-76	12	Sec. 14, T22N, R20E
4- 9-76	11	Sec. 3, T22N, R21E
4- 9-76	11	Sec. 35, T23N, R20E
4- 9-76	9	Sec. 32, T23N, R20E
4- 9-76	3	Sec. 18, T23N, R20E
4- 9-76	30	Sec. 30, T23N, R20E
4- 9-76	10	Sec. 36, T22N, R19E
4- 9-76	3	Sec. 31, T22N, R20E
4- 9-76	10	Sec. 32, T22N, R20E
4-10-76	12	Sec. 23, T24N, R18E
4-10-76	4	Sec. 13, T25N, R18E
4-10-76	1	Sec. 23, T25N, R18E
4-10-76	2	Sec. 23, T25N, R18E
4-10-76	4	Sec. 14, T25N, R16E
4-10-76	17	Sec. 13, T25N, R16E
5- 6-76	1	Sec. 35, T22N, R15E
5- 7-76	6	Sec. 22, T22N, R19E
5- 7-76	5	Sec. 2, T22N, R19E
5- 7-76	8	Sec. 20, T22N, R20E
5- 7-76	15	Sec. 22, T23N, R20E
5-10-76	1	Sec. 11, T20N, R15E
5-12-76	12	Sec. 24, T20N, R15E
5-13-76	4	Sec. 18, T22N, R16E
5-18-76	1	Sec. 15, T22N, R15E
5-18-76	1	Sec. 2, T22N, R15E

Table 6. Aerial antelope survey of hunting district 680 by Frank Gjersing July 19 and 20, 1976.

No. Observed	Classification Adult Males	Yearling Males	Females	Fawns	Location
11	1		8	2	Sec. 6, T25N, R17E
2			2		Sec. 26, T25N, R18E
15	1	2	7	5	Sec. 12, T24N, R18E
10	1		8	1	Sec. 14, T25N, R19E
4	1		3		Sec. 14, T25N, R20E
2			2		Sec. 13, T25N, R20E
3			3		Sec. 34, T25N, R22E
20			11	9	Sec. 35, T24N, R23E
1			1		Sec. 36, T24N, R23E
3	1	2			Sec. 30, T24N, R24E
9	1	_	4	4	Sec. 28, T24N, R24E
TOTAL 80	6	4	49	21	

Production ratios: 43 fawns/100 does, 36 fawns/100 adults, 21 bucks/100 does.

Table 7. Aerial antelope survey of hunting district 471 by Robert Watts July 26-29, 1976.

Survey Unit	Adult Males	Yearling Males	Females	Fawns	Total
E. of Stanford	5	12	34	24	75
S. of Denton	28	33	249	207	517
N. of Denton*	13	7	119	97	236
Hunting District Totals	46	52	402	328	828

Productivity ratios: 82 fawns/100 females, 24 males/100 females

*North portion of this unit is in study area.

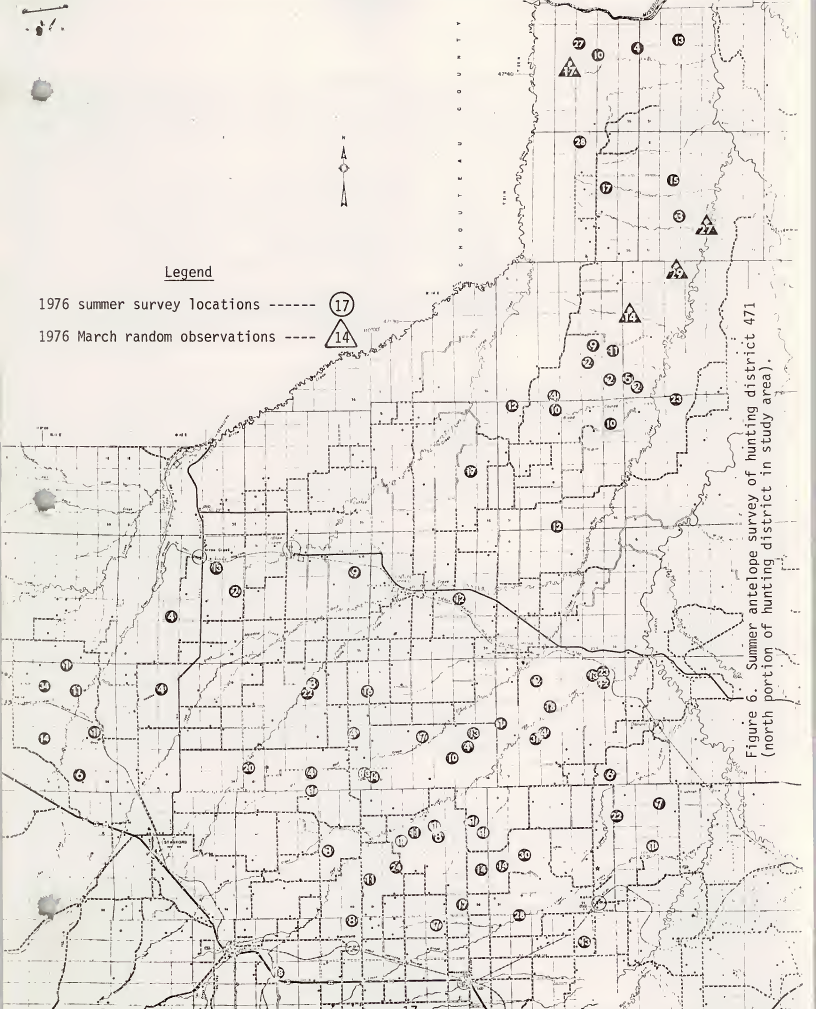

Legend
1976 summer survey locations ------ (17)
1976 March random observations ---- △14
CHOUTEAU COUNTY
MISSOURI
N
STANFORD

Figure 6. Summer antelope survey of hunting district 471 (north portion of hunting district in study area).

This herd grew to at least 90 in 1971 and then experienced high mortality during the winter of 1971-72 (Eichhorn 1974). Starvation is thought to be the major reason for this dieoff although there may be other contributing factors. About 23 bighorns survived this dieoff and the herd remains at about this number at the present time.

The bighorns were not located until July 1, 1976 when 14 ewes and 4 newborn lambs were observed. These bighorns were located in the SW¼ Sec. 21 and NW¼ Sec. 28, T22N, R23E, the junction of Two Calf Creek and the Missouri River. On July 1 and on July 7 (second time they were observed) they were observed grazing among a herd of domestic cattle. Eichhorn and Watts have been looking into competition between these bighorns and cattle.

Further investigations will center on bighorn distribution, their key areas, productivity, possibly bighorn-cattle competition and related problems.

Elk

Elk, *Cervus canadensis*, are also native to the area however few, if any, elk reside in the study area. Elk have been observed in the southeast corner of the study area in recent years but none have been located so far. Further investigations will attempt to locate elk if present and determine their distribution and key areas.

FINDINGS - UPLAND GAME BIRDS

Sage Grouse

Sage grouse, *Centrocercus urophasianus*, are native to the area and were observed by the Lewis and Clark expedition in 1804-05 (Thwaites 1904). They are common in the sagebrush vegetation type along the south side of the Missouri River from Winifred east to the Robinson Bridge and along the north wide of the river from about Birch Creek east to the Robinson Bridge. A few are scattered throughout the remainder of the study area's sagebrush vegetation type. Sage grouse observations are recorded in Table 8.

Sage grouse are threatened in the study area as they are throughout Montana as the sagebrush they are dependent upon is being constantly destroyed and replaced by grain or hay or grass. This trend may eventually lead to the destruction of most sage grouse. Documentation of sagebrush reduction in the study area will be attempted.

Known strutting grounds were checked and two previously unknown grounds were located (Figure 7) (Table 8). Maximum numbers of cocks observed on these strutting grounds is recorded in Table 8. Numbers of breeding cocks were up from 1975 on four known grounds and down on three grounds.

Continued emphasis will be placed on locating key areas such as wintering grounds and strutting grounds. With this data it will be easier to determine what sagebrush areas are most valuable to the survival of sage grouse in this area.

Table 8. Upland game bird observations December 1975 - June 30, 1976.

Date	No. Observed	Classification	Location
		SAGE GROUSE	
12-30-75	110		Taffy Cr., Sec. 23, T22N, R19E
12-30-75	23		Taffy Cr., Sec. 16, T22N, R19E
3- 4-76	10		Dry Wolf Cr., Sec. 33, T21N R16E
3- 4-76	10		Arrow Cr., Sec. 8, T22N, R15E
3- 4-76	15		Arrow Cr., Sec. 20, T21N, R15E
3-31-76	15	12 cocks, 3 hens	Strutting Ground No. 7, see Figure 7 for location.
3-31-76	38	14 cocks, 24 hens	Strutting Ground No. 8, see Figure 7 for location.
3-31-76	21	17 cocks, 4 hens	Strutting Ground No. 5, see Figure 7 for location.
3-31-76	20	16 cocks, 4 hens	Strutting Ground No. 6, see Figure 7 for location.
4- 6-76	8	8 cocks	Strutting Ground No. 7, see Figure 7 for location.
4- 6-76	12	12 cocks	Strutting Ground No. 2, see Figure 7 for location.
4- 9-76	5	5 cocks	Strutting Ground No. 1, see Figure 7 for location.
4- 9-76	1	1 cock	Strutting Ground No. 6, see Figure 7 for location.
4- 9-76	20	20 cocks	Strutting Ground No. 10, see Figure 7 for location.
5- 7-76	15	15 cocks	Strutting Ground No. 7, see Figure 7 for location.
5- 7-76	77	77 cocks	Strutting Ground No. 1, see Figure 7 for location.
5- 7-76	28	28 cocks	Strutting Ground No. 2, see Figure 7 for location.
5-17-76	40+		S½ Sec. 8, T21N, R21E
5-17-76	2	2 cocks	Strutting Ground No. 6, see Figure 7 for location.
6- 2-76	8	1 hen, 7 young	Sec. 15, T21N, R19E
		SHARP-TAILED GROUSE	
12-23-75	1		Sec. 24, T22N, R16E
1- 5-76	39		Sec. 6, T22N, R18E
1- 9-76	3		Sec. 35, T23N, R16E
1- 9-76	11		Sec. 25, T22N, R16E
1- 9-76	11		Sec. 1, T21N, R17E
1-30-76	1		Sec. 36, T23N, R21E
2-24-76	12		NE¼ Sec. 30, T21N, R19E
2-25-76	1		N½ Sec. 36, T22N, R15E
2-25-76	3		Sec. 29, T22N, R16E
2-25-76	1		Sec. 28, T22N, R16E
2-29-76	5		Sec. 13, T21N, R18E
2-29-76	2		NE¼ Sec. 1, T21N, R17E
2-29-76	25		N½ Sec. 2, T21N, R17E
3- 2-76	1		SE¼ Sec. 6, T22N, R18E

Table 8 (continued). Upland game bird observations December 1975 - June 30, 1976.

Date	No. Observed	Classification	Location
		SHARP-TAILED GROUSE continued	
3- 4-76	1 flock (aerial observation)		Dry Wolf Cr., Sec. 6, T20N, R16E
3- 4-76	2 flocks (aerial observation)		Dry Wolf Cr., Sec. 13, T21N, R15E
3- 4-76	1 flock (aerial observation)		Arrow Cr., Sec. 3, T20N, R15E
3- 4-76	1 flock (aerial observation)		Arrow Cr., Sec. 16,T20N, R15E
5- 4-76	24		SE¼ Sec. 9, T22N, R17E
5- 5-76	1		Sec. 35, T21N, R15E
5- 5-76	1		Sec. 14, T21N, R15E
5- 6-76	1		Sec. 35, T22N, R15E
5- 6-76	1		Sec. 2, T21N, R15E
5- 6-76	1		Sec. 12, T21N, R15E
5- 6-76	1		Sec. 26, T21N, R15E
5- 6-76	1		Sec. 7, T21N, R16E
5- 6-76	1		Sec. 15, T20N, R15E
5- 6-76	4		Sec. 34, T21N, R15E
5- 7-76	4		Sec. 1, T21N, R15E
5- 7-76	1		Sec. 11, T21N, R15E
5- 7-76	5		Sec. 26, T21N, R15E
5- 7-76	2		Sec. 2, T20N, R15E
5-12-76	1		Sec. 15, T20N, R15E
5-12-76	1		Sec. 2, T20N, R15E
5-12-76	1		Sec. 3, T20N, R15E
5-12-76	1		Sec. 11, T20N, R15E
5-12-76	2		Sec. 15, T20N, R15E
5-12-76	1		Sec. 28, T20N, R15E
5-13-76	1		Sec. 26, T22N, R15E
5-13-76	1		Sec. 4, T22N, R16E
5- 4-76	24	24 cocks (dancing ground)	SE¼ Sec. 9, T22N, R17E
5- 7-76	35	35 cocks (dancing ground)	Sec. 12, T21N, R15E
5- 7-76	16	16 cocks (dancing ground)	Sec. 5, T20N, R16E
5-10-76	14	14 cocks (dancing ground)	Sec. 16, T20N, R16E
5-10-76	30	30 cocks (dancing ground)	Sec. 15, T20N, R15E

Table 8 (continued). Upland game bird observations December 1975 - June 30, 1976.

Date	No. Observed	Classification	Location
		SHARP-TAILED GROUSE continued	
5-12-76	16	16 cocks (dancing ground)	Sec. 24, T20N, R15E
5-13-76	18	18 cocks (dancing ground)	Sec. 26, T22N, R15E
5-13-76	10	10 cocks (dancing ground)	Sec. 24, T22N, R15E
5-13-76	12	12 cocks (dancing ground)	Sec. 5, T22N, R16E
5- 9-76	31	31 cocks (dancing ground)	Sec. 16, T22N, R15E
		RING-NECKED PHEASANT	
12-20-75	48		Sec. 27, T23N, R22E
12-23-75	2	2 cocks	Sec. 27, T23N, R18E
12-24-75	19	7 cocks, 12 hens	Sec. 27, T21N, R15E
1- 9-76	68	29 cocks, 39 hens	Sec. 12, T21N, R17E
1- 9-76	4	1 cock, 3 hens	Sec. 3, T22N, R16E
3-18-76	1	cock	Sec. 14, T21N, R17E
5- 6-76	1	cock	Sec. 35, T22N, R15E
5- 6-76	1	cock	Sec. 2, T20N, R15E
5-10-76	1	cock	Sec. 36, T20N, R15E
5-13-76	1	cock	Sec. 26, T20N, R15E
5-13-76	1	cock	Sec. 23, T22N, R15E
5-13-76	1	cock	Sec. 2, T21N, R15E
5-18-76	2	cock and hen	Sec. 35, T21N, R15E
5-19-76	1	cock	Sec. 35, T22N, R15E
		HUNGARIAN PARTRIDGE	
12-20-75	12		Sec. 30, T23N, R22E
1- 5-76	16		Sec. 19, T22N, R19E
1- 9-76	5		Sec. 35, T23N, R16E
1- 9-76	12		Sec. 3, T22N, R16E
3- 2-76	5		SE¼ Sec. 6, T22N, R18E
3-18-76	2		Sec. 10, T22N, R16E
5- 5-76	2		Sec. 32, T20N, R15E
5- 6-76	2		Sec. 27, T21N, R15E
5-11-76	2		Sec. 1, T20N, R15E
5-11-76	2		Sec. 22, T21N, R15E
5-12-76	2		Sec. 23, T20N, R15E
5-12-76	2		Sec. 19, T20N, R16E
5-13-76	1		Sec. 25, T22N, R15E
5-13-76	2		Sec. 22, T22N, R15E
5-18-76	2		Sec. 23, T21N, R15E
5-19-76	2		Sec. 35, T22N, R15E

Table 9. Maximum numbers of male prairie grouse observed on breeding grounds 1974, 1975 and 1976.

Ground Number	Location[1]	Year 1974[2]	1975[2]	1976
	SAGE GROUSE			
1	State	NC	67	77
2	Sec. 10, T22N, R19E		25	28
3	Sec. 11, T22N, R19E		3*	0
4	Sec. 12, T22N, R19E		3*	0
5	Sec. 8, T22N, R20E		26	17
6	Sec. 1, T22N, R20E		36	16
7	Cutbank Creek	13	18	15
8	Sec. 27, T22N, R19E		11	14
9	Taffy Creek	0	7	NC
10	Knox Ridge	20	9	20
(New)-AA	Sec. 18, T22N, R21E			15
(New)-BB	Sec. 35, T23N, R20E			3*
	SHARP-TAILED GROUSE			
ST-1	Middle Two Calf	0	0	5
ST-2	Knox Ridge	9	10	16
(New)-A	Sec. 15, T20N, R15E			30
(New)-B	Sec. 24, T20N, R15E			16
(New)-C	Sec. 16, T20N, R16E			14
(New)-D	Sec. 5, T20N, R16E			16
(New)-E	Sec. 12, T21N, R15E			35
(New)-F	Sec. 26, T22N, R15E			18
(New)-G	Sec. 24, T22N, R15E			10
(New)-H	Sec. 16, T22N, R15E			31
(New)-I	Sec. 5, T22N, R16E			12
(New)-J	SE¼ Sec. 9, T22N, R17E			24

* Needs further inventory to make sure it is a permanent ground.
0 No birds present when checked.
NC Not checked.

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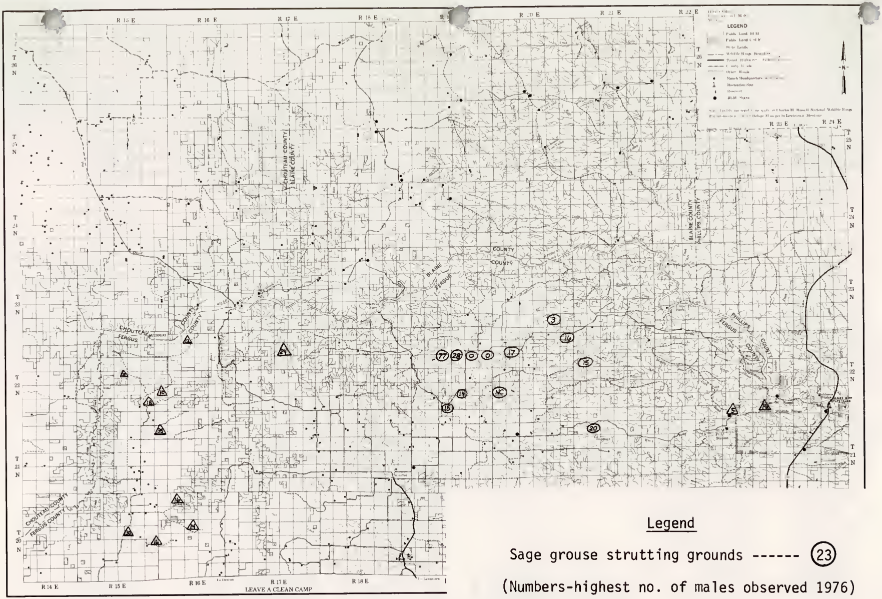
[1] See Figure 7 for locations.
[2] Data from Watts 1975.



Legend

Sage grouse strutting grounds ------ ㉓

(Numbers-highest no. of males observed 1976)

Sharp-tailed grouse dancing grounds ------ △16

(Numbers-highest no. of males observed 1976)

Middle Missouri River study area (eastern segment)
Boundary --

Figure 7. Prairie grouse breeding grounds (eastern segment of study area).

Sharp-tailed Grouse

Sharp-tailed grouse, *Pedioecetes phasianellus*, are native to the area and were observed by the Lewis and Clark expedition in 1804-05 (Thwaites 1904). They are common throughout the study area except for much of the timbered portions. They are primarily observed in areas that have a combination of breaks, remnant grasslands and grain fields. Sharptail observations are presented in Table 8.

Known dancing grounds were checked and ten previously unknown grounds were located (Figure 7). Nine of these unknown grounds were found between Arrow Creek and the Judith River-Dry Wolf Creek as this was the area where an intensive survey was conducted. Numbers of males observed on these grounds were recorded in Table 8. Hook also discusses these grounds in the western segment.

Future surveys will concentrate on locating grounds, wintering areas and productivity.

Ring-necked Pheasants

Ring-necked pheasants, *Phasianus colchicus*, are common in parts of the study area. Primary concentrations are along the Missouri River (islands are most favorable), Sections 1, 12 and 13, T21N, R17E, Sections 6, 7 and 18, T21N, R18E; Upper Dog Creek in vicinity of Winifred on the bench between Arrow Creek and Dry Wolf Creek and the Judith River bottom. Pheasant observations are reported in Table 8.

One hundred and seventy-five pheasants were classified during the winter (78 males and 97 females) for a ratio of 1.3 hens per cock.

Plans for a spring pheasant census route are still tentative as pheasant numbers in the study area may not warrant such action.

Hungarian Partridge

Hungarian partridge, *Perdix perdix*, are observed throughout the study area as they occupy all major vegetation types except conifer forest. This very versatile bird is most plentiful in the agriculture-grassland vegetation complex as it appears to prefer grain fields associated with good grassland vegetation in the study area.

Hun observations are reported in Table 8.

Turkeys

In the 1960's, the Montana Department of Fish and Game planted turkeys, *Meleagris gallopavo*, north of Winifred where they survived and increased rapidly. They were hunted and some were even transplanted. They primarily occupied the forested covered breaks and adjacent grain and hay fields. These turkeys eventually disappeared for no apparent reason and now only one or two gobblers are occasionally seen.

According to Watts 1976 a small flock of turkeys can be found in the southeast corner of the study area in the Armells Creek-Two Calf Creek drainages, however I have not been able to locate them yet.

Waterfowl

Numerous ducks breed throughout the study area using the many stock ponds, reservoirs and streams and the Missouri River. Major breeding species are mallards, *Anas platyrhynchos*, gadwalls, *Anas strepera*, American widgeons, *Mareca americana*, shovelers, *Spatula clypeata*, blue-winged teal, *Anas discors*, and pintails, *Anas acuta*.

Some Canada geese, *Branta canadensis*, nest along the Missouri River, lower Judith River and possibly some reservoirs. Hook made surveys of breeding Canada geese along the Missouri River and recorded data on nesting success, clutch size and nesting sites. Data is written up under "Waterfowl" in Hook's section of this report.

Other Birds

In the study area bald eagles, *Haliaeetus leucocephalus*, are primarily observed during their fall and spring migrations when they move along the Missouri River. There have been reports of bald eagles nesting along the Missouri and attempts will be made to verify this possibility.

Golden eagles, *Aquila chrysaetos*, are common throughout the year. Many different hawks, owls, songbirds and other birds are observed in the study area. The different species of birds, seasons present and evidence of breeding in the study area can be found in the booklet by Skaar 1975.

Special reference should be made to the mourning dove, *Zenaidura macroura*, which has songbird status in Montana and game bird status in many other states. In the study area doves are plentiful during the breeding season and remain until cold weather forces them south. Doves are outstanding game birds and also provide excellent eating. The Montana State Legislature should make the dove a game bird in Montana thus allowing Montanans to hunt them and to harvest birds which are now being harvested by other states.

PREDATORS

Coyotes, fox bobcats and skunks are common, however, the coyote is by far the outstanding and dominant predator. Much controversy surrounds the coyote and opinions differ on its influence on the environment.

In the study area both aerial and ground observations have revealed a very large coyote population. Coyotes are observed frequently and a day spent sounding a siren received many answers from coyotes. During a two-day survey of deer winter range on Arrow Creek and along Judith River tributaries and including ferry time between Lewistown and the deer winter ranges, 58 coyotes were observed.

Local residents and other knowledgeable people feel that the coyote population is at a very high level. Many reports describe coyotes killing deer within the study area and Montana Department of Fish and Game data from a study just east of the study area also indicates numerous deer being killed by coyotes. The combination of a very high coyote population and a low deer population is causing a situation where coyotes may be exerting a significant effect on deer populations in the study area.

BEAVERS

Beavers, *Castor canadensis*, are distributed primarily along the Missouri River and also along the main tributaries.

Cache counts have been conducted along the Missouri River in the past. This data is reported by Hook in his coverage of the western segment of the study area.

PRAIRIE DOGS

Several black-tailed prairie dog, *Cynomys ludovicianus*, towns are scattered throughout the study area. They are found along the Missouri River and on the high plains adjacent to the breaks. So far most towns are less than ten acres; however, a very large one, yet unmapped, exists in the Big Sag between Arrow Creek and the Judith River. A map of prairie dog towns will be prepared after all prairie dog towns are located.

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Prepared by: Kerry Constan
September 1976

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MONTANA DEPARTMENT OF FISH AND GAME
ENVIRONMENT AND INFORMATION DIVISION

JOB PROGRESS REPORT
RESEARCH PROJECT STATEMENT

State: Montana

Title: Middle Missouri River Planning Project

Project No.: FW-3-R-4

Job No.: I-b & c (Western Segment) - Upland Game Birds, Big Game

Period Covered: October 1, 1975 through June 30, 1976

ABSTRACT

The western segment of the middle Missouri River planning project originates at Morony Dam on the Missouri River and follows the course of the river east to the vicinity of the mouth of the Judith River. It is an area where small grain production is the predominant land use, with livestock being a secondary agricultural product. Through the center of this northern plains region flows the Missouri River and with it the associated river breaks type habitat. The historic, cultural and recreational values of this area are widely known. However, extensive information on the abundance, distribution and habitat requirements of the various species of wildlife in the area is often lacking.

The possible future uses of this part of the Missouri River range from protection under the Wild and Scenic Rivers Act to complete inundation by the construction of High Cow and Fort Benton dams. Considering these and other possible alternatives, it is important that the most detailed information on our wildlife resources be collected and made available for the evaluation of these various alternatives and to assess their impacts on our wildlife resources.

Three big game species are found in the western portion of the study area. They are mule deer *(Odocoileus hemionus)*, white-tailed deer *(Odocoileus virginiana)*, and antelope *(Antilocapra americana)*. Sage grouse *(Centrocerus urophasianus)*, sharp-tailed grouse *(Pedioecetes phasianellus)*, pheasants *(Phasianus colchicus)*, and Hungarian partridge *(Perdix perdix)* are the primary upland game birds. Waterfowl are typical of the northern great plains. Two hundred and sixty species of birds are known to occur in the area, the majority of which are nongame species. Three species of reptiles, two species of amphibians and seventeen species of nongame mammals which receive high priority ratings by the department's Nongame and Endangered Species Program are possible inhabitants of the project area.

OBJECTIVES

The purpose of this study is to determine the extent and location of big game, upland game bird and waterfowl habitat, to obtain information on breeding populations, production and hunter utilization and to ascertain

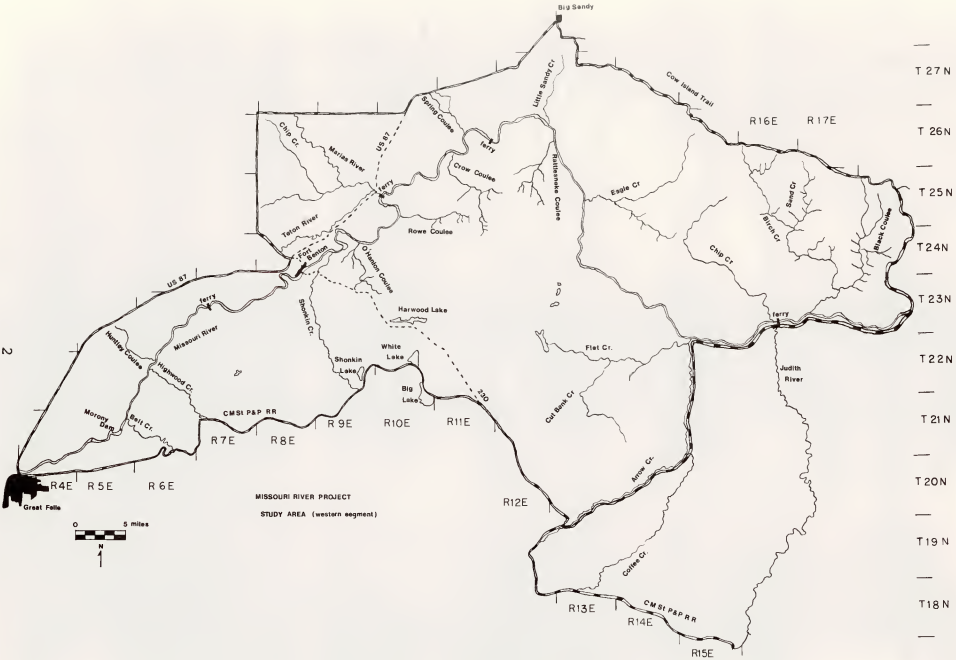

Figure 1. Middle Missouri River project area (western segment).

the distribution and relative abundance of wildlife in the middle Missouri River project area. In conjunction with these objectives, specific problems affecting wildlife are to be delineated and possible solutions to these problems are to be formulated.

PROCEDURES

The primary objective during this first segment of the project has been to become familiar with the study area and to determine wildlife species present and their general distribution. Information on soils, vegetation, climate, geology and wildlife was obtained from appropriate state and federal agencies.

Wildlife observations were made by means of fixed-wing aircraft, ground, vehicle and river float trips. The vegetation along a pheasant crowing route and eight upland game bird production routes was typed at 1/10 mile intervals. During each wildlife observation, data were recorded on date, species, sex, age, location, climatic conditions, slope, exposure, vegetation type and topography. Data were summarized seasonally as winter (Dec.-Feb.), spring (Mar.-May), summer (June-Aug.) and fall (Sept.-Nov.).

STUDY AREA DESCRIPTION

Location

The middle Missouri River project area is located in northcentral Montana. The western segment of the study area originates at Morony Dam on the Missouri River approximately 8 miles northeast of Great Falls, Montana. The study area continues northeastward following the course of the Missouri River, taking in the adjacent river breaks and uplands to the vicinity of Black Coulee on the north and Arrow Creek on the south side of the river where it joins the eastern segment of the project area (Figure 1). The study area is bounded on the west and north by U. S. Highway 87 and Cow Island Trail and on the south by the Milwaukee Railroad. Two major mountain ranges (Bearpaws to the north and Highwoods to the south) border the study area.

Chouteau County takes in the largest portion of the study area, which also includes parts of Cascade, Fergus and Blaine counties. Major centers of human population in or adjacent to the study area are the towns of Fort Benton, Big Sandy, Geraldine and Loma.

PHYSIOGRAPHY AND CLIMATE

The greater part of the study area lies in the glaciated portion of the great plains. It is characterized by broad rolling-to-broken divides sloping gently toward the Missouri River. The larger streams are entrenched and bordered by rugged breaks which are locally eroded into badlands (Gieseker 1931). Elevation of the Missouri River varies from 3100 feet at Morony Dam to 2400 feet at the mouth of the Judith River. The plains elevation ranges from 3500 to 2700 feet.

The climate is characterized by low rainfall, dry atmosphere, hot summers, cold winters and a large portion of sunny days. Precipitation averages 13.5 inches and ranges between 12.3 and 15.2 inches annually for Chouteau County. Greater than 70 percent of the moisture occurs between March 1 and September 1, with May and June being the months of greatest precipitation. Average annual temperatures range between 41.1 F to 44.8 F. The frost-free period is generally from mid-May to mid-September, and averages 135 days. Winds are strong and persistent, with Chinooks common.

SOILS

Six soil associations (Figure 2) occur in the project area. The following is a brief description of each (Southard 1973):

JS - Joplin-Scobey Association. These are soils on glacial till. they occur on the undulating glacial till plain of northern Montana and are used mainly for grain production.
BSV - Bearpaw-Sprole-Vida Association. These are dark, moderately fine textured soils on continental glacial till. They are used primarily for grain and hay production.
BA - Badlands. Dominantly rough-gullied land along major streams. They are used primarily for grazing.
SBW - Spring Creek-Blaine-Woodhurst Association. This association is confined to the Bearpaw Mountains. It is associated with the igneous rocks that form the highlands and is used for range and timber production.
DJU - Danvers-Judith-Utica Association. These are dark, medium-textured soils underlain by gravel. They are used for small grain production.
SC - Spring Creek-Cowood Association. This association is confined to the Highwood Mountains and is used for small grain, range and timber production.

VEGETATION

Payne (1973) describes six vegetative rangeland types in the study area (Figure 3). They are the foothill grassland, northern grassland, Teton River-Judith Basin grassland, Missouri Breaks scrub pine, central grassland and undifferentiated stream and lake bottoms. A list of characteristic species associated with these types is found in Table 1.

For the purposes of field observations and vegetation typing on vehicle routes, 7 general vegetation types and 21 subtypes were selected for use. The major vegetation types were grassland, sagebrush, agricultural, river-bottom, ponderosa pine, brushland and open water areas.

Grassland Type

This type occupies the largest area of native vegetation in the study area. It is composed of native grasses and forbs as described above. It was divided into three subtypes:

Table 1. Vegetative rangeland types.

	Types					
Common Species	Foothill Grassland	Northern Grassland	Judith Teton River Basin Grassland	Missouri Breaks Scrub Pine	Central Grassland	Undifferentiated Stream and Lake Bottoms
Grasses	Bluebunch wheatgrass Western wheatgrass Idaho fescue Sheep fescue	Blue grama Western wheatgrass Blue grasses Prairie junegrass	Needle-and-thread Bluebunch wheatgrass Sandberg bluegrass Prairie junegrass	Western wheatgrass Little bluestem Sandberg bluegrass	Blue grama Western wheatgrass Needle-and-thread Bluebunch wheatgrass Prairie junegrass Plains muhly	Western wheatgrass Bluegrasses Cheatgrass brome Needle-and-thread
Shrubs	Serviceberry Chokecherry Snowberry Rose			Sagebrush Yucca Plains prickly pear	Big sagebrush Silver sagebrush Broom snakeweed Plains prickly pear	Rose Snowberry Buffaloberry Big sagebrush Silver sagebrush
Forbs	Western Yarrow Clubmoss Phlox	Fringed Sagewort Clubmoss	Fringed sagewort	Phlox Wild buckwheat	Fringed sagewort	Lambsquarter goosefoot Plantain
Trees				Ponderosa Pine Juniper		Cottonwood Willow

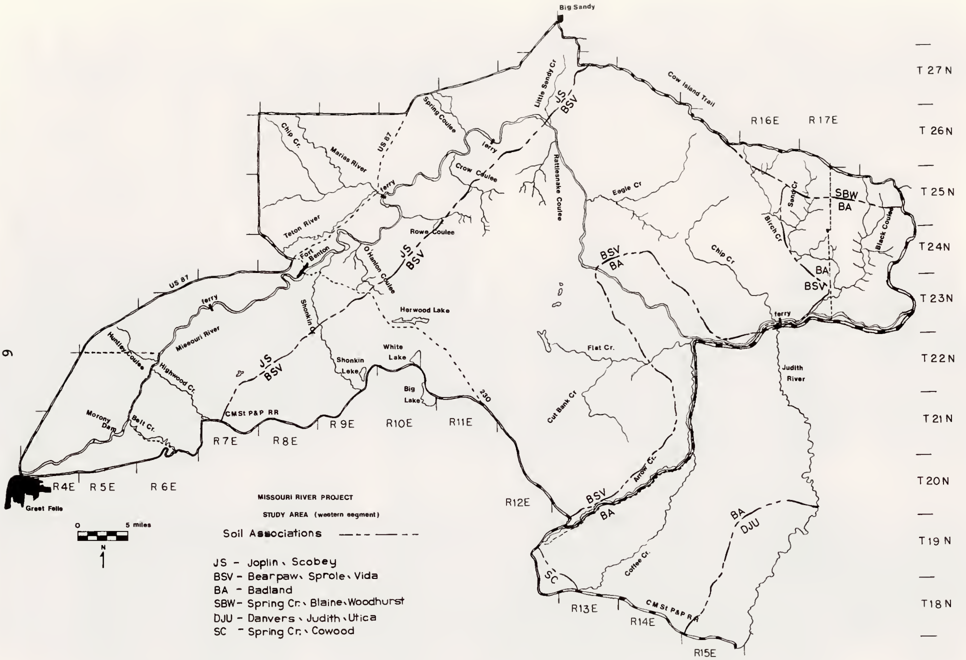

Figure 2. Soils map.

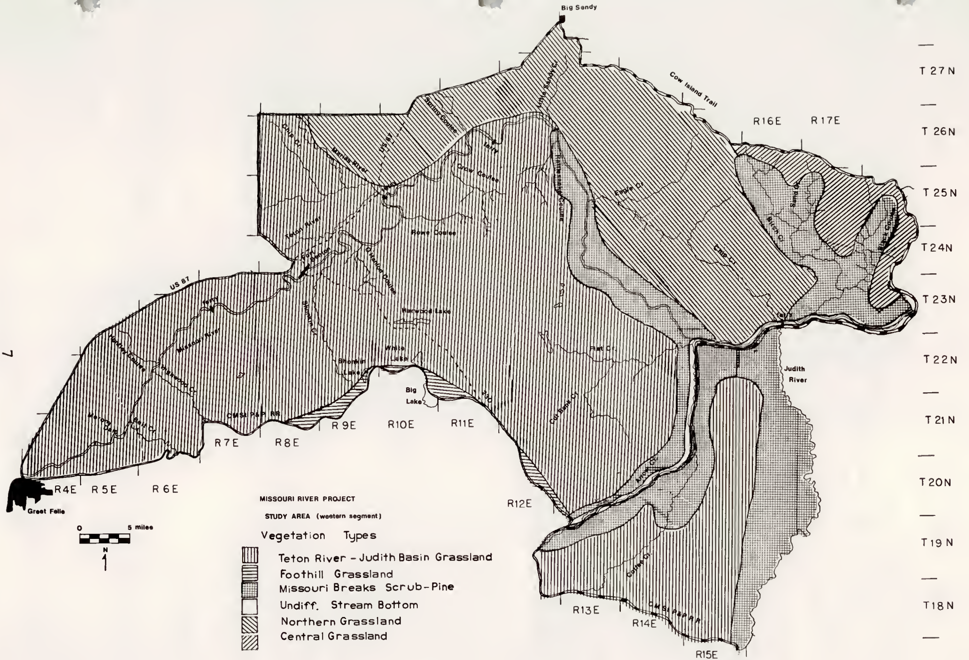

Figure 3. Vegetation map.

(1) Grassland
(2) Sagebrush - This subtype includes scattered stands of big sagebrush *(Artemisia tridentata)* and silver sage *(Artemisia cana)* with grasses remaining in the dominant role.
(3) Yucca - This subtype includes yucca *(Yucca glauca)* as a secondary species.

Sagebrush Type:

The sagebrush type consists of areas where big and silver sage are the dominant shrub species. Three subtypes were identified:

(1) Sagebrush - As above
(2) Greasewood - A subtype with greasewood *(Sarcobatus vermiculatus)* as a secondary shrub species.
(3) Yucca - In this subtype yucca occurs scattered through a sagebrush stand.

Agricultural Type:

This type is characterized by manmade monocultures. Six subtypes were identified in this type which are the direct or indirect result of agricultural development:

(1) Small grain - This subtype is predominantly wheat with secondary amounts of barley and oats.
(2) Summer fallow - Alternately cropped.
(3) Hay and pasture - Subtype of domesticated grasses.
(4) Built-up areas - Includes homesites, shelterbelts, etc.
(5) Alkali seep - This subtype consists of barren alkaline areas either natural or man caused.
(6) Crested wheatgrass - This subtype is areas of rangeland or former cropland reseeded to crested wheatgrass.

Riverbottom Type

The riverbottom type is found along the Missouri, Teton and Marias riverbottoms and major tributary streams. It is composed of plains cottonwood *(Populus deltoides)* and willow *(Salix* spp.*)*. Two subtypes were identified:

(1) Cottonwood - This subtype has cottonwood as a dominant overstory with willow as an understory.
(2) Willow

Ponderosa Pine Type

This type is found in the rough breaks of the eastern segment of the study area. Ponderosa pine *(Pinus ponderosa)* forms the dominant overstory in an open forest. Two subtypes were recognized.

(1) Ponderosa pine - As above
(2) Sagebrush - This subtype occurs as scattered stands of sage in the ponderosa pine type.

Open Water Type

(1) Lake - This subtype includes natural lakes and manmade reservoirs.
(2) Marsh - This subtype is characterized by shallow water areas with cattail *(Typha* sp.*)*. sedges and rushes.

Brushland Type

The two subtypes listed here commonly occur in association with the grassland and sagebrush types:

(1) Juniper - Creeping juniper *(Juniperus horizontalis)* is the common species in this subtype.
(2) Rose - Woods rose *(Rosa woodsii)* is the dominant species in this subtype.

LAND USE

The history of land use in the study area can best be compared with that of Chouteau County. The establishment of a trading post at the site of Fort Benton in 1842 by the American Fur Trading Company marked the beginning of the permanent presence of white men in the area. By the late 1870's stockmen had settled the Highwood Mountains and expanded onto the plains in the early 1880's. After 1887 the area north of the Marias and Missouri Rivers was opened to settlement. Prior to 1910 the land was utilized for stock raising and was public range. Between 1908 and 1917 the public range was settled and fenced by dryland farmers on 160 to 320-acre tract homesteads. This marked the beginning of the breaking up of the native prairies for dryland farming. Severe droughts from 1917 to 1921 greatly reduced crop acreages and eliminated many marginal farms.

In 1925, 411,661 acres of land were cultivated in Chouteau County (Figure 4). By 1928 this figure had declined to 270,560 acres cropped (Gieseker 1931). Today, of the over 2.5 million acres in Chouteau County, 47.4 percent or 1,102,263 acres of land are classified as cropland. Table 2 presents a breakdown of landownership and use for Chouteau County. As can be seen in the table, the county is predominantly private land with approximately 50 percent of that land utilized for cropland and 50 percent for rangeland as of 1967. Since 1967 additional acreages of rangeland have been converted to cropland with the advent of new farming equipment and changes in grain and livestock markets. Figure 5 presents a recent map of land use in Chouteau County. It can be seen that from the original beginnings in the Highwood bench and Shonkin areas, dryland farming has expanded, taking in most of the plains and divides leaving the river breaks and coulees as rangeland.

In summary, in the past 100 years the land use of this area has changed from native grassland prairies and their associated wildlife to

Table 2. Chouteau County land use and ownership.

Landownership	Acres	Percent
Private	2,059,844	82.1
State	267,698	10.7
Federal	145,919	5.8
Urban	27,839	1.1
Water	7,500	0.3
Total	2,508,800	
Land Use (Except Federal)		
Cropland	1,102,263	47.4
Rangeland	1,154,266	49.6
Woodland	24,359	1.0
Tame pasture	31,529	1.4
Other	15,125	0.6
Total	2,327,542	

an area of intensive small grain production through the middle of which flows the Missouri River.

BIG GAME

The three species found in the study area are mule deer, white-tailed deer and antelope. Field work did not begin in earnest until the spring of 1976. Therefore, only that season will be dealt with in this report with some initial findings from this summer's work which will be fully covered in subsequent reports.

Mule Deer

During March through June, 324 mule deer in 63 observations were found in various sections of the study area. Classifications were made of 62 of these deer. In addition, 463 deer were observed during a game management survey of the Missouri River from Morony Dam to Fort Benton (Fiest pers. comm.). Due to the small number of classified observations, no effort will be made to break these down by hunting district in this report.

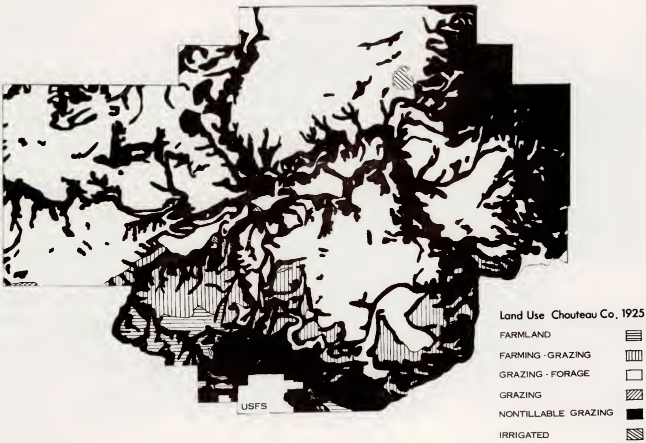

Figure 4. Chouteau County land use 1925.

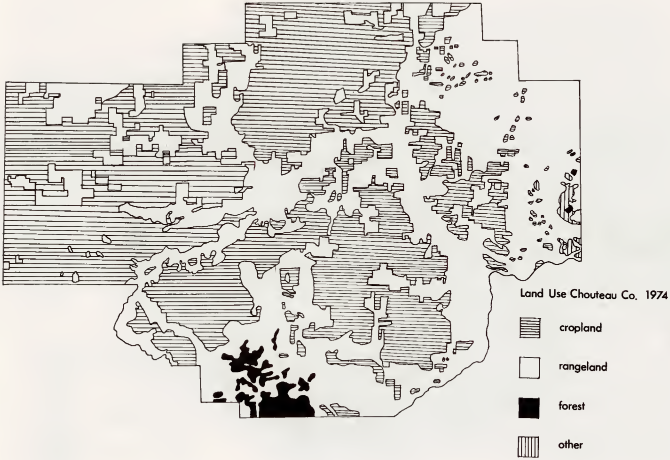

Figure 5. Chouteau County land use 1974.

Distribution

The seasonal distribution of mule deer observations is shown in Figure 6. Most of the mule deer observed were found closely associated with the Missouri River, Teton River, Arrow Creek, Coffee Creek and Wolf Creek breaks. Additional observations were made in the foothills of the Bearpaw and Highwood Mountains. Mule deer were found along the higher ridges of the breaks during an aerial survey of the Missouri River in early March. This flight was made during winter-like conditions of snow cover and temperature. The utilization of the higher reaches of the breaks would appear to be related to the snow-free conditions on south-facing, windblown slopes, and the cover and forage provided by sagebrush and other shrub species.

During the spring, mule deer appear to expand their seasonal range out of the breaks proper onto the benches and plateaus above the breaks and the creek and coulee bottoms below. Adult does were commonly observed on the islands and cottonwood bottoms along the Missouri River during the month of June. Several fawns were also located at this time, which would indicate that this habitat type may be of importance to fawning and early fawn rearing by mule deer.

Population Characteristics

In the spring of 1976, 51 mule deer in 14 observations were classified with the following results: adult bucks - 4, adult does - 38, fawns - 9, total 51; fawns/100 does - 23.7, fawns/100 adults - 21.4, bucks/100 does - 10.5; population structure (percent) - bucks-7.8, does-74.5, fawns-17.6. An additional 273 mule deer were observed during this season, but were unclassified. This information may not be characteristic of the structure of the mule deer population, since additional data from this coming fall and winter will be needed to gain a more accurate picture. The aerial survey of the Missouri River on March 2, from Morony Dam to Fort Benton, resulted in a ratio of 66 fawns/100 adults. A total of 463 deer was observed with 203 adults, 134 fawns and 126 unclassified.

White-tailed Deer

Distribution

Limited observations during the spring found white-tailed deer associated with the bottoms of the Missouri River and other major tributaries. This species is also found in the foothill portions of the Highwood and Bearpaw mountains (Figure 6). The whitetail appears to be more restricted in numbers and overall distribution in the study area than the mule deer.

Population Characteristics

Twenty-five white-tailed deer were classified in seven observations during the spring of 1976. The following are the results: does - 14, fawns - 11, fawns/100 does - 78.6. Though based on limited data, the white-tailed deer appears to be experiencing a higher rate of productivity and/or over-winter fawn survival than the mule deer in the study area.

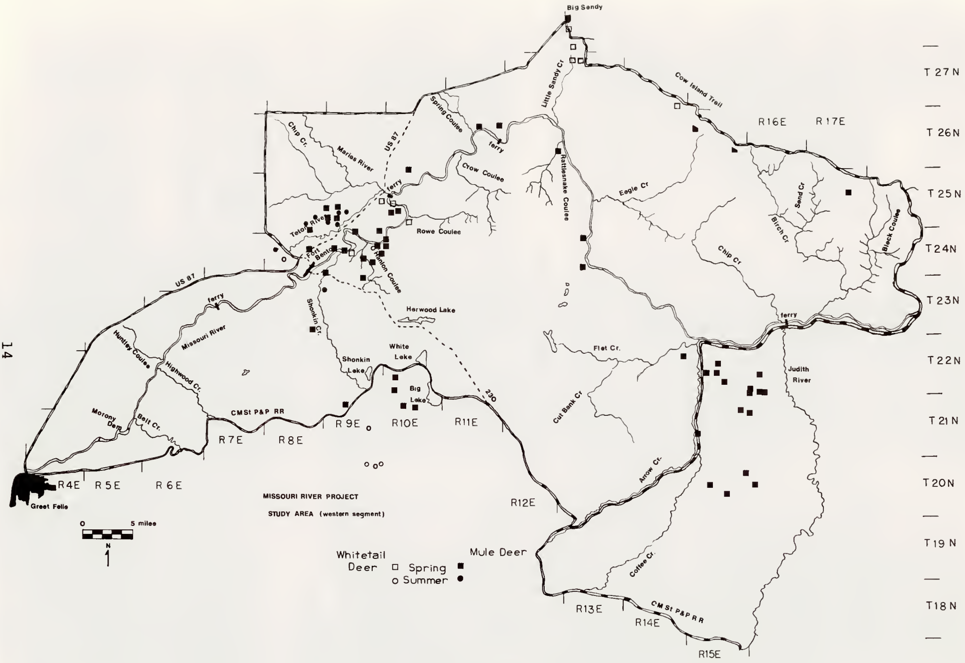

Figure 6. Mule deer and white-tailed deer distribution.

Antelope

Distribution

Figure 7 presents the distribution of 130 antelope in 19 observations made from November 1975 to June 1976. In general, this species is found in small bands throughout the study area. They appear to make use of the upland plateaus and plains during most of the year, moving into the river and coulee breaks during the winter. Additional data should be collected to delineate specific winter ranges and herds. The numbers and distribution of this species have undoubtedly been restricted with the advent and expansion of dryland farming.

Population Characteristics

Data on seasonal antelope classifications are presented in Table 3. A decline in the number of fawns/100 adults was noted from the fall of 1975 to the spring of 1976. Based on limited numbers of observations, this would appear to be due to overwinter fawn loss and an increase in the number of adult bucks in the spring sample.

Table 3. Antelope classifications.

Classification	Season		
	Fall	Winter	Spring
Bucks	3	x	9
Does	17	x	19
Fawns	5	x	5
Unclassified	x	37	35
Total	25	37	68
Fn/100 Does	29.4	x	26.3
Fn/100 Adults	25	x	17.9
Bucks/100 Does	17.6	x	47.3
		Population Structure (%)	
Bucks	12	x	27.2
Does	68	x	57.6
Fawns	20	x	15.2

Antelope hunting district 470 on the south side and 610 on the north side of the Missouri River take in the majority of the western segment of the project area. Table 4 presents some data from summer antelope surveys that have been conducted by the Montana Department of Fish and Game. Although these two hunting districts take in a larger area than that of the current study area, the data presented should be indicative of the antelope population present in the study area.

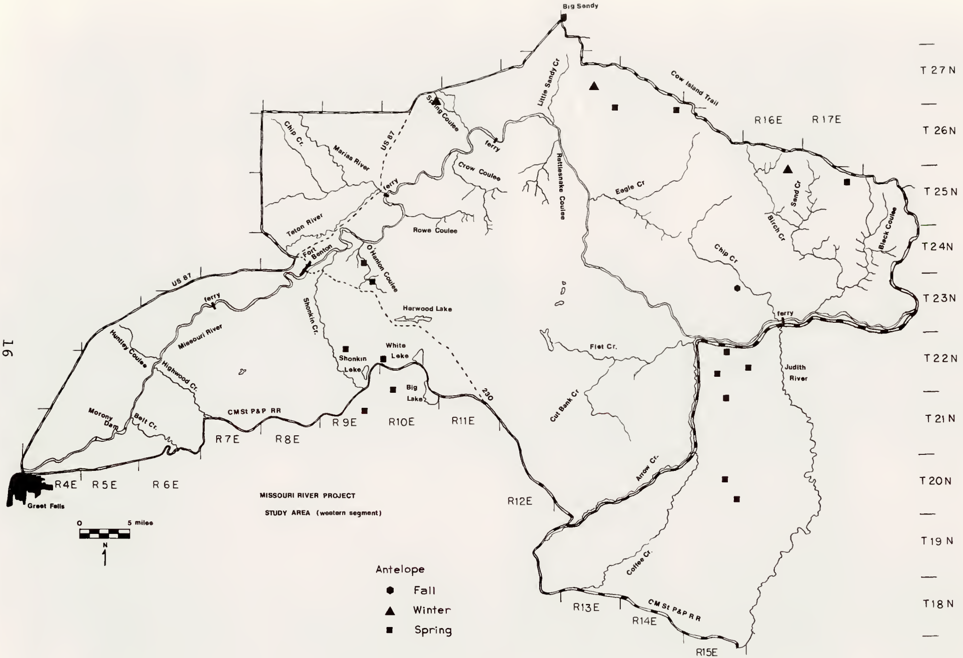

Figure 7. Antelope distribution.

Table 4. Summer antelope surveys (districts 470 and 610)

Classification	District			
	470	610		
Year	1974	1963	1966	1969
Bucks	133			
Does	598			
Fawns	268			
Total	999	706	181	220
No./sq. mi.	.39	.30	.20	.20
Bucks/100 Does	22	57	49	46
Fawns/100 Does	45	91	95	100
Fawns/100 Adults	37	58	64	67

From Table 4 it can be seen that hunting district 470 had a ratio of 37 fawns/100 adults in 1974 compared to an average of 63 fawns/100 adults for district 610 for the years 1963, 1966 and 1969. Although the information is not comparable on the basis of years or areas, it may indicate a decline in antelope productivity due to lower fawn production, fawn survival, or related environmental factors.

Data on antelope harvest in districts 470 and 610 are presented in Tables 5 and 6. In 1974 hunting district 470 experienced a harvest of 246 antelope for a hunter success of 49.2 percent. Hunting district 610, for the years 1971-1973, had an average harvest of 138 antelope for 60.3 percent hunter success. Also during this period a general decline in number of antelope taken and hunter success was noted. For the 5-year period 1965-1969, the number of antelope taken in district 610 averaged 145.8 with 62.4 percent hunter success which compares closely to the 1971-1973 figures. The sex and age composition for the antelope harvest in these districts is shown in Table 6. The composition of the 1974 harvest from district 470 was 69 percent bucks, 28 percent does and 3 percent fawns. The 3-year average (1971-73) for district 610 was 66.3 percent bucks, 30 percent does and 3.7 percent fawns.

Table 5. Antelope harvest (districts 470 and 610)

Year	District	No. Permits	Percent Hunter Success	Total Harvest
1974	470	500	49.2	246
1973	610	250	46	108
1972	610	250	62	132
1971	610	250	73	174
1971-73 Average		250	60.3	138

Table 6. Sex and age composition of antelope harvest.

District	Year	Percent Bucks	Percent Does	Percent Fawns
470	1974	69	28	3
610	1973	69	31	0
610	1972	60	29	11
610	1971	70	30	0
1971-73 Average		66.3	30	3.7

UPLAND GAME BIRDS

Sage Grouse

Distribution

During the winter and spring of 1976, 10 observations of 212 sage grouse were made. Figure 8 presents the distribution of these observations in the study area. Sage grouse distribution is directly related to the distribution of sagebrush. They are found in the sagebrush creek and coulee bottoms of the major tributaries and associated breaks. The highest concentration of this species is found in the heads and on the divides between Birch Creek, Sand Creek and Black Coulee on the north side of the Missouri River. In this area a native sagebrush-grassland vegetation type exists and supports a significant sage grouse population. Throughout the rest of the study area this species is restricted to areas where remnant stands of sagebrush have been left in farming operations or have received a degree of protection due to federal ownership.

Population Characteristics

Five sage grouse strutting grounds were located during the spring of 1976. These grounds were found on the north side of the Missouri River between Birch Creek and Black Coulee (Figure 8). The maximum number of males observed on each of these grounds is presented in Table 7. The strutting grounds averaged a maximum of 23.2 males. This is similar to the average of 22.7 males per ground that Wallestad (1974) found in southeastern Montana for the 1963-1973 period.

Brood information is still being collected for this season, but preliminary data show an average of 5 juveniles per brood. Sage grouse broods averaged 5.5 young in management region 4 for the period of 1964-1968. During this same period wing surveys showed an average of 209 junveniles per 100 adults in the hunter harvest sample.

Table 8 presents the results of 5 years of data collected at the Fort Benton check station operated on the opening day of the hunting season.

Table 7. Sage grouse strutting grounds (1976).

Ground No.	No. of Males	Date	Location
1	28	4/22	Sec. 26, T 26N, R16E
	35	4/24	
	48	5/ 8	
2	13	4/24	Sec. 9, T25N, R18E
3	16	5/ 1	Sec. 35, T26N, R16E
4	25	5/ 8	Sec. 11, T25N, R17E
5	14	5/ 8	Sec. 15, T25N, R17E

Table 8. Fort Benton check station.

Year	1964	1965	1966	1967	1968
Date	9/20	9/18	9/18	9/17	9/15
No. Hunters	86	46	81	103	85
Manhours	413	139	353	408	460
Sage Grouse					
No.	5	0	0	3	41
Percent	5	0	0	3	26
Sharptails					
No.	93	58	150	111	119
Percent	93	100	100	97	74
Total Birds	100	58	150	114	160
Hours/Bird	4.2	2.4	2.4	3.6	2.9
Birds/100 Hunters	114	126	185	111	188

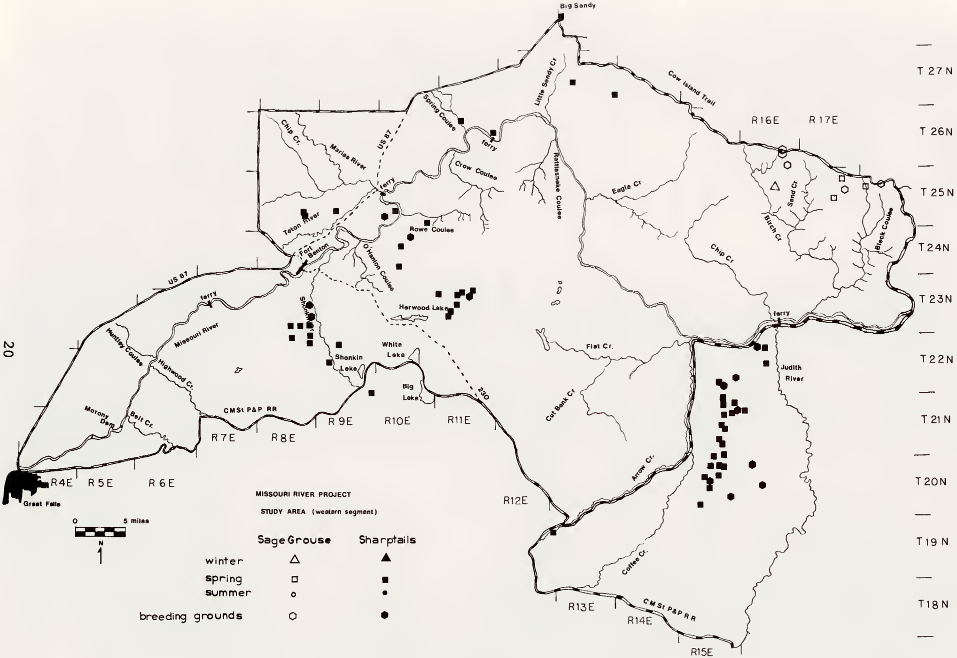

Figure 8. Sage grouse and sharp-tailed grouse distribution.

From the table it can be seen that for the area south of the Missouri River, sage grouse are a rather minor segment of the upland game bird harvest. Only in 1968 were they a significant portion of the total harvest.

Sharp-tailed Grouse

Distribution

From March through May, 73 observations of sharptails were made with a total of 515 birds. The distribution of these observations is shown in Figure 8. Sharp-tailed grouse are one of the more abundant species of upland game birds in the study area. They are found throughout the area where suitable native grassland habitat remains. As can be seen from the map, this spring's effort in locating sharptails was primarily concentrated in the areas between Arrow Creek and the Judith River (eastern segment of the project area), and the vicinity of Fort Benton. In subsequent years other areas will receive more intensive coverage to entirely cover the project area. Some overlap of information will occur here this year with that presented in the report on the eastern segment of the middle Missouri River project.

Population Characteristics

Spring surveys located 13 sharptail dancing grounds (Table 9). The average number of males observed was 19.2. Since no effort was made to census each new ground to determine peak of male attendance, these figures are not necessarily the maximum number of males found at each ground. Brown (1962-67), in his study of the sharptail in the Highwood Mountains, found an average breeding cock density of 6 cocks per square mile and an average of 21.5 males per ground. Breeding season habitat consisted of areas of a minimum of 1 square mile of native grassland. He stressed the importance of standing herbaceous cover as being a critical element in the breeding habitat. A direct relationship was found between increases in herbaceous cover and increases in numbers of breeding males, the reverse also being true. Shrub interspersion and topography had compensating roles. In 1967, Brown found nest success to be 62 percent, with an average first clutch size of 12.7 eggs. Hens (9) were found to nest an average of .68 mile from the breeding ground.

Data from management region 4 (Montana Department of Fish and Game) show an average of 6.7 young per brood and 458 young per 100 adults for the period of 1964 through 1968. In 1973 these figures were 5.9 per brood and 589 per 100 adults. Region 4 wing surveys show an average of 232 juveniles per 100 adults in the hunter harvest for the period of 1964-68.

Opening day check station data at Big Sandy show 36 and 54 sharptails recorded for a ratio of 500 and 233 juveniles per 100 adults for 1965 and 1966, respectively.

Table 9. Sharp-tailed grouse dancing grounds.

Ground	Location	No. Males	Date
Fort Benton Area			
Rowe Coulee	S. 3, T24N, R10E	11	4/16
Spring Coulee	S. 13, T23N, R8E	27	4/21
O'Hanlon Coulee	S. 8, T24N, R10E	10	4/30
Rowe Bench	S. 30, T25N, R10E	21	5/10
Harwood Lake	S. 4, T23N, R11E	30	4/29
Arrow Creek Area			
N. Wolf Creek	S. 12, T21N, R15E	35	5/7
Wolf Creek	S. 5, T20N, R16E	16	5/7
S. Wolf Creek	S. 16, T20N, R16E	14	5/10
Coffee Creek	S. 15, T20N, R15E	30	5/10
Carter Farm	S. 24, T20N, R15E	16	5/12
S. Sag	S. 26, T22N, R15E	18	5/13
Mid. Sag	S. 24, T22N, R15E	10	5/13
N. Sag	S. 5, T22N, R16E	12	5/13

Hungarian Partridge

Distribution

The Hungarian partridge is the most widely distributed upland game bird in the study area (Figure 9). It is found in a variety of habitats from the dryland agricultural areas to sagebrush-grassland. During the first project year, 46 observations of 117 birds were made. A majority of these observations were of breeding pairs, and therefore potentially represent a covey.

Population Characteristics

Preliminary observations for this year indicate an average of 9.5 young per brood for 4 brood observations. Region 4 data show an average brood size of 9.7 for the period of 1966-72. Based on wing surveys, an average of 271.5 juveniles per 100 adults was found in the harvest sample. Table 10 presents data on winter covey sizes from region 6, and shows a general reduction in covey size from December to February.

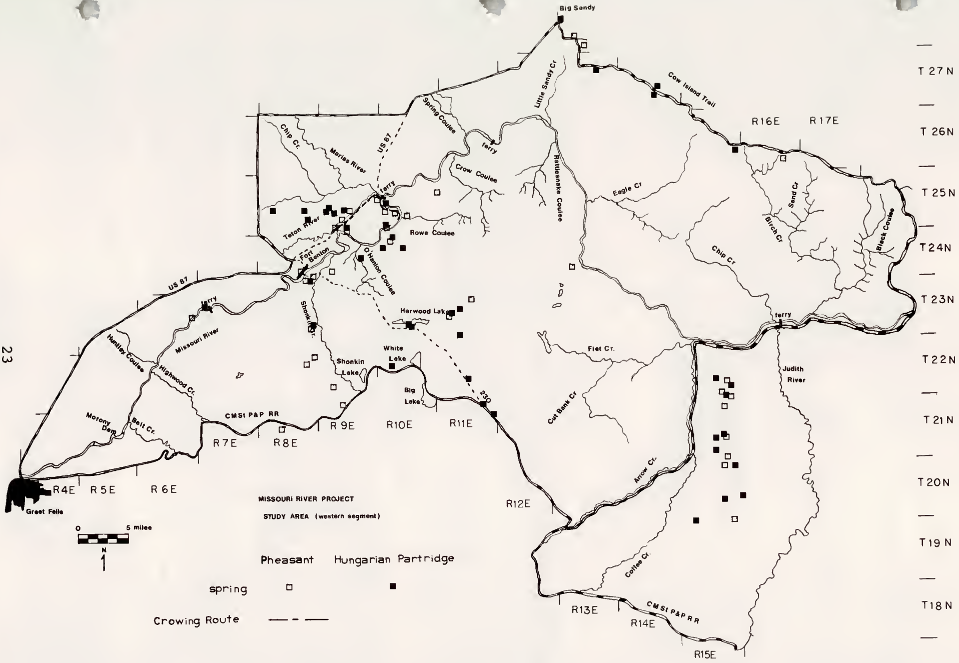

Figure 9. Hungarian partridge and pheasant distribution.

Table 10. Winter covey size - Hungarian partridge (R-6).

Date	12/1-16		12/16-1/1		1/1-15		1/15-2/28	
Year	No.	Ave.	No.	Ave.	No.	Ave.	No.	Ave.
1965	8	9.5	28	6.2	24	5.5	17	5.1
1966	6	9.5	5	11.6	4	8.5	40	7.1
1967	21	8.6	4	6.0	13	7.4	69	7.1
Ave.		9.2		7.9		7.1		6.4

Pheasant

Distribution

Observations (39) of 60 pheasants were made during the spring of 1976. The distribution of these observations is presented in Figure 9. The pheasant is found associated with the deciduous river, creek and coulee bottoms in the study area. The pheasant may be experiencing a high in its population due to a succession of mild winters and moist springs which have produced excellent ground cover conditions. This spring they were commonly found inhabiting grassland bottoms which would appear to be marginal habitat due to the absence of permanent deciduous cover.

Population Characteristics

A pheasant crowing route was established this spring. The route starts approximately 7 miles south of Loma on U. S. Highway 87 along the Teton River and proceeds north to the Marias River bridge. On May 18, the route was extended 5 miles for a total of 12 miles on a secondary gravel road from Highway 87 to the Loma ferry and from there south on a dirt road along the Missouri River. Table 11 presents the results from the crowing route. As can be seen, pheasant crowing activity peaked on May 10, with an average of 6.3 calls per 2-minute stop for the first 7 miles of the route.

The vegetation along the route was typed at 1/10 mile intervals (Table 12). Cottonwood-willow riverbottom, grassland and sagebrush types accounted for 61.1 percent of the vegetation along the route. Small grain and summer fallow which are alternately cropped each year amounted to 12.5 percent of the cover. This area appears to provide a good combination of cover and food for pheasants.

Region 4 brood data for the period of 1966-1972 show an average of 6.1 young per brood with a range of 5.5 to 6.4. In 1971, 77.1 percent of the pheasant hatch occurred between May 23 and June 27. The hatch was later and more widely distributed in 1972 when 57.5 percent of the hatch occurred between May 31 and June 27.

Table 11. Pheasant crowing route - Loma.

Stops	Dates - No. Calls/Stop 3/17	4/13	4/21	5/10	5/18
1	1	6	8	12	16
2	0	2	7	7	7
3	0	6	7	7	6
4	2	4	3	2	3
5	0	3	2	6	3
6	3	2	5	5	4
7	5	2	3	5	4
Ave.	1.6	3.6	5.0	6.3	6.1
8					10
9					10
10					11
11					12
12					13
Ave.					8.3

Table 12. Vegetation types - pheasant crowing route.*

Types	Left Side No.	%	Right Side No.	%	Average No.	%
Riverbottom	65	60.2	7	6.5	72	33.3
Grassland	6	5.6	25	23.1	31	14.4
Sagebrush	12	11.1	17	15.7	29	13.4
Hay	8	7.4	21	19.4	29	13.4
Homesites	2	1.9	5	4.6	7	3.2
Brush	6	5.6	6	5.6	12	5.6
Small Grain	1	0.9	3	2.8	4	1.9
Summer Fallow	4	3.7	19	17.6	23	10.6
Pasture	4	3.7	5	4.6	9	4.2

*Vegetation typed at 1/10 mile intervals.

WATERFOWL

Canada Geese

Breeding Season - Missouri River

During the spring of 1976, a Canada goose nest survey was conducted on the Missouri River. The sections from the Carter ferry to the Loma ferry and Coal Banks Landing to the Robinson bridge were covered. Fifty-seven Canada goose nests were located (Figure 10). The fate was subsequently determined for 27 (47.4 percent) of these nests. The fate was unknown for 28 (49 percent) of the nests due to their not being relocated or being washed out by high water after the peak in nesting activity. Two nests were still being incubated at the time of the last survey.

A majority (35 or 61 percent) of the 57 nests located were in the section of river between the Carter ferry and Loma ferry. Eighteen nests (32 percent) were found between Coal Banks Landing and the PN ferry with only four (7 percent) being located below the PN ferry to Robinson bridge. This pattern of nesting distribution appears to be directly related to the availability of suitable islands.

In conjunction with the nesting survey, a ground survey of the breeding population was also conducted. Table 13 gives a breakdown of these observations by river section. A total population for the sections surveyed was 405 Canada geese with a potential breeding population of 248 birds, utilizing pairs and singles as an index. At the same time as the ground survey, an aerial survey of the section between Judith Landing and Robinson bridge was conducted by the BLM. This census showed 37 pairs, 4 singles and 8 birds in groups. It indicates a higher population of pairs than the ground census of the same area.

Canada geese showed a high degree of association with islands. Three hundred fifty-two (87 percent) of the 405 geese observed were associated with islands. This broke down as 83 percent of the pairs, 83 percent of the singles and 93 percent of the groups on or around islands.

The fate of the known 27 nests is shown in Table 14. The nest success was 66.6 percent with 29 percent of the nests being deserted and 1 (3.7 percent) destroyed. From the table it can be seen that the average clutch size for successful nests was larger than for unsuccessful nests. This may indicate that desertion or destruction occurred during egg laying rather than incubation.

The average clutch size for known fate nests was 5.2 eggs. The distribution of clutch sizes is shown in Table 15. Seventy seven and seven-tenths percent of the nests contained between three and seven eggs. Egg success for 18 successful nests was 88.3 percent with 13 of 111 eggs being infertile.

The 18 successful nests of the known fate nests produced 98 young for an average of 5.4 young per nest. Expanding this information to include

Table 13. Canada goose breeding population survey - 1976.

Section	Missouri River - (Ground) Pairs	Singles	Groups	Total
Carter to Fort Benton	30	7	15	82
Fort Benton to Loma	32	7	53	124
Loma to Virgelle	Not surveyed			
Virgelle to Hole-in-Wall	11	4	25	51
Hole-in-Wall to PN Ferry	12	2	58	84
PN Ferry to Robinson Bridge	27	4	6	64
Total	112	24	157	405

Table 14. Canada goose nesting success - 1976.

Fate	No. Nests	Percent	No. Eggs	Ave. Clutch
Hatched	18	66.6	111	6.16
Deserted	8	29.6	24	3
Destroyed	1	3.7	4	4

Table 15. Distribution of clutch sizes (known fate nests).

Clutch Size	No. Nests	Percent
1	1	3.7
2	1	3.7
3	5	18.5
4	5	18.5
5	2	7.4
6	5	18.5
7	4	14.8
8	3	11.1
9	1	3.7

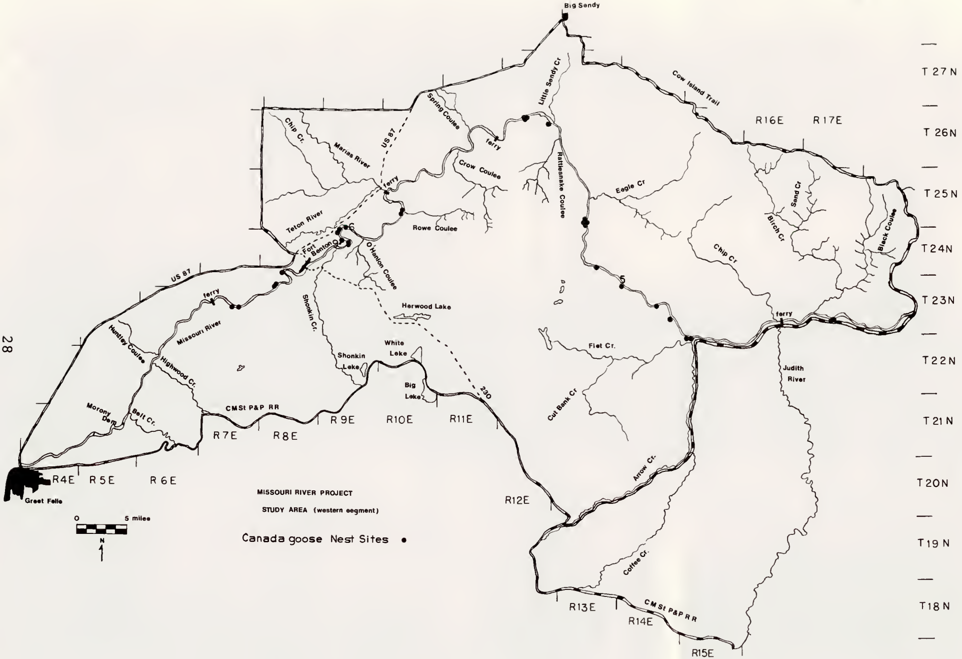

Figure 10. Canada goose nest sites - Missouri River.

those nests for which the fate was unknown (28) results in an estimate of 101 additional young produced. This would give an estimated production for the 57 nests located during the survey of 199 young for an average of 3.5 young per nest.

All nests located during the survey were on islands. Most of the nests were found on the upstream ends or sides of the islands where high water and/or ice scouring had reduced the vegetative cover. Litter was the basic nest material for 97.4 percent of 38 nests.

Table 16 presents data on nest site vegetation, distance of the nests from water, and height above water. As can be seen, willow was the predominant vegetation utilized by the geese for the nest site. Nests were located an average of 17.4 feet from the water with 68.4 percent of the nests being within 20 feet of the river. The distance of the nests above water averaged 4.6 feet with 50 percent less than 5 feet above the river.

Table 16. Nest site vegetation, distance of nest from water, and height above water.

Vegetation Types	Number of Nests	Percent
Willow	33	86.8
Grass	1	2.6
Equisetum sp.	3	7.9
Gravel	1	2.6

Distance from Water (ft.)	Number of Nests	Percent
0 - 5	14	36.8
6 -10	3	7.9
11 -20	9	23.7
21 -30	6	15.8
31 -40	4	10.5
41+	2	5.3

Height above Water (ft.)	Number of Nests	Percent
1	5	13.2
2	4	10.5
3	5	13.2
4	5	13.2
5+	19	50.0

The above data must be correlated with river stage heights in order to determine the effect of river levels on the goose nesting success. Additional information on the sizes of islands utilized by Canada geese as nest sites and their availability is required in order to determine preference.

In general, the nesting season began about the last week of March with egg laying and a peak of hatch occurred during the last week of April. However, follow-up checks in late May indicated a considerable degree of unsuccessful late nesting and/or renesting (6, or 10 percent of the nests). These nests showed a smaller clutch size and were often flooded due to the peak spring runoff of the Missouri River. This and other general observations indicate that the Missouri River Canada goose population may be near a saturation level. One island supported 12 nests in a colonial nesting situation and multiple nests on the smaller islands were common. It appears that the generally preferred smaller islands may be in short supply for the size of the breeding population with colonial and multiple nesting occurring on those available. The relatively high degree of late nesting and/or renesting may indicate a portion of the breeding population may be unable to find or hold suitable nest sites during the main nesting season. Although these observations are speculative, further surveys in subsequent years should be able to confirm them or provide other answers. In addition, insight should be gained into the effect the nesting situation has on overall production.

Breeding Season - Marias River

Table 17 presents the results of 5 years of Canada goose breeding ground surveys of the Marias River from Tiber Dam to the mouth. For the period of 1971-1975, an average of 30.2 breeding pairs and 27 singles was observed. Utilizing pairs and singles as an index to the breeding population (Hanson and Eberhardt 1971) this represents 57 possible breeding pairs on this section of the Marias River. A nest survey of this section of the Marias River is planned for the coming spring.

Table 17. Canada goose breeding ground surveys - Marias River - Tiber Dam - mouth.

Date	Pairs	Singles	Groups	Total
1971	21	12	14	67
1972	26	31	37	120
1973	40	26	17	123
1974	31	41	11	114
1975	33	25	7	98
Ave.	30.2	27	17.2	104.4

FURBEARERS

Beaver

The beaver *(Castor canadensis)* is one of the primary furbearers found along the Missouri River. They are associated with the cottonwood-willow islands and riverbanks. Their lodges are constructed as bank burrows. Their distribution along the river appears related to the availability of islands. Tables 18 and 19 present the results of beaver cache counts conducted on the Missouri and Marias rivers by the Montana Department of Fish and Game. For the 6 years covered, an average of 54.4 caches was observed on the upper reach of the Missouri River from Great Falls to the mouth of the Judith River. In 1974, the reach of river from the mouth of the Judith to Robinson bridge supported 43 caches. Combining different yearly averages and sections, a figure of 97.5 caches was estimated for the Missouri River from Great Falls to Robinson bridge. For the Marias River from Tiber Dam to the mouth, an average of 35 caches was found for 5 survey years. A majority of the caches were located on the lower reach of the Marias below the Meissner Ranch.

Table 18. Beaver cache counts - Missouri River.

	Year							
River Section	1954	1968	1969	1971	1972	1974	1975	Average
Great Falls to Carter Ferry	9	7	6	4	5		4	5.8
Carter Ferry to Fort Benton	14	7	6	3	4		7	6.8
Fort Benton to Marias River	28	18	15	15	7		9	15.3
Marias River to Alkali Coulee	26	24	16	13	8			17.2
Alkali Coulee to Judith River	9	12	7	9	9			9.2
Judith River to Stafford Ferry						5		5
Stafford Ferry to Power Plant Ferry						12		12
Power Plant Ferry to CMR						6		6
CMR to Robinson Bridge						20		20
Total								97.5

Table 19. Beaver cache counts - Marias River

Section	Year 1968	1969	1971	1972	1975	Average
Loma to	44	18	13	26	22	24.6
Meissner Ranch to Tiber Dam	4	3	9	22	14	10.4
Total	48	21	22	48	36	35

NONGAME SPECIES

Skaar (1975) identifies 260 species of birds as occurring in latilongs 17, 18 and 19. These latilongs generally take in the middle Missouri River project area. Varying amounts of information are known for these species. Many are known to breed within the area and others are seasonal or migratory residents. Upland game birds account for 10 of these species with waterfowl representing 29 species. Nongame species account for by far the majority with 221 species.

Great Blue Herons

Three great blue heron rookeries were located this spring along the Missouri River. Table 20 gives the location of the rookeries and the number of nest structures observed.

Table 20. Great blue heron rookeries.

Location	No. Nest Structures	Area
S 9, T24N, R9E	50	West bank
S 4, T24N, R9E	35	East bank
S 4, T24N, R9E	36	West bank

All of these rookeries were active this year; however, the number of active nests was not determined.

Nongame Mammals, Reptiles and Amphibians

The Montana Department of Fish and Game, through its Nongame and Endangered Species Program has designed a priority rating system to identify key nongame species. The criteria for the rating system are species security level, public appeal and economic and ecological impact of species range expansion and/or increase in numbers. For the four counties (Cascade, Chouteau, Fergus and Blaine) which are partially taken in by the middle Missouri River project, a list of 17 mammals, 3 reptiles and 2 amphibians was compiled for species with high positive or negative priority ratings. Table 21 presents this list of species and their ratings. Not all of these species may be in the project area, but the potential exists.

Table 21. Nongame species list.

	Priority Rating
Mammals	
Merriam shrew *(Sorex merriami)*	11.5
Dwarf shrew *(Sorex nanus)*	11.75
Preble shrew *(Sorex preblei)*	10.25
Long-legged bat *(Myotis volans)*	8.24
Townsend's bat *(Plecotus townsendii)*	6.25
Black-footed ferret *(Mustela nigripes)*	41.5 *
Least weasel *(Mustela nivalis)*	7.5
Wolverine *(Gulo gulo)*	20.0
Swift fox *(Vulpes velox)*	24.5
Wolf *(Canis lupus)*	27.5 *
Lynx *(Lynx canadensis)*	17.5
Black-tailed prairie dog *(Cynomys ludovicianus)*	6.0
Mountain phenacomy *(Phenacomys intermedius)*	5.75
Sagebrush vole *(Lagurus curtatus)*	9.25
Norway rat *(Rattus norvegicus)*	-20.25
Desert cottontail *(Sylvilagus auduboni)*	11.25
Mountain cottontail *(Sylvilagus nuttalli)*	7.0
Reptiles	
Snapping turtle *(Chelydra serpentina)*	8.5
Plains hognose snake *(Heterodon nasicus)*	8.25
Spiny softshell turtle *(Trionyx spiniferus)*	7.5
Amphibians	
Spotted chorus frog *(Pseudocris clarki)*	4.0
Dokato toad *(Bufo hemiophrys)*	8.2

*Endangered species

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Prepared by: Dan L. Hook
September 1976

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639.9
FW-3-R-11
1-b + 1-C

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MONTANA DEPARTMENT OF FISH, WILDLIFE & PARKS
ECOLOGICAL SERVICES DIVISION

FINAL REPORT

State: Montana

Project No.: FW-3-R-11

Job No.: 1-b & 1-c

Title: Middle Missouri River Planning Project- Big Game and Game Birds

Period Covered: 7/1/79 through 6/30/81 and 7/1/82 through 9/30/82

(Note: Jobs 1-b and 1-c were held in abeyance for one year (Segment 10) while the special project W-140-R, programmatic oil and gas leasing EIS was completed.)

ABSTRACT

This report is a final summation of FW-3-R-8 and 9 covering the period July 1, 1979 through June 30, 1981.

Data are presented on the location, physiography, climate, soils, vegetation and land use of the study area.

Data were collected on big game, upland game birds, waterfowl and beaver (*Castor canadensis*). Big game present in the study area include mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), antelope (*Antilocapra americana*), elk (*Cervus canadensis*), and bighorn sheep (*Ovis canadensis*). Upland game birds present include sage grouse (*Centrocercus urophasianus*), sharp-tailed grouse (*Pediocetes phasianellus*), Hungarian partridge (*Perdix perdix*) and ring-necked pheasants (*Phasianus colchicus*). Canada geese (*Branta canadensis*) were the primary waterfowl species studied.

A discussion of specific problems affecting wildlife is presented and recommendations are made.

A discussion of instream flow requirements needed to protect the security of Canada geese nest-site islands is presented.

OBJECTIVES

The objectives of the project are to determine the extent and location of wildlife habitat, to ascertain the status, distribution, composition and critical use areas (such as winter ranges) of the wildlife present, and to obtain information on breeding populations, productivity and hunter utilization. In conjunction with these objectives, specific problems affecting wildlife are to be delineated and possible solutions to these problems are to be formulated.

WILDLIFE

Wildlife observations were made from the ground by vehicle and afoot and from the air by using a fixed-wing Supercub aircraft. Binoculars and spotting scope were used as an aid for wildlife observations and classifications. Sage grouse and sharp-tailed grouse breeding grounds were located and surveyed during spring. A Supercub aircraft was used to find and survey grouse breeding grounds by flying slowly and at a low altitude over potential ground sites during the period between sunrise and about 3 hours after sunrise.

To determine pheasant densities, a 16-mile long crowing count route with 17 stops, each 1 mile apart, was set up. The observer pauses at each stop, records the number of pheasant crows heard during a 2-minute interval, and then moves on to the next stop as quickly as possible and repeats the procedure.

Game bird production data were gathered by random observations of broods along routes.

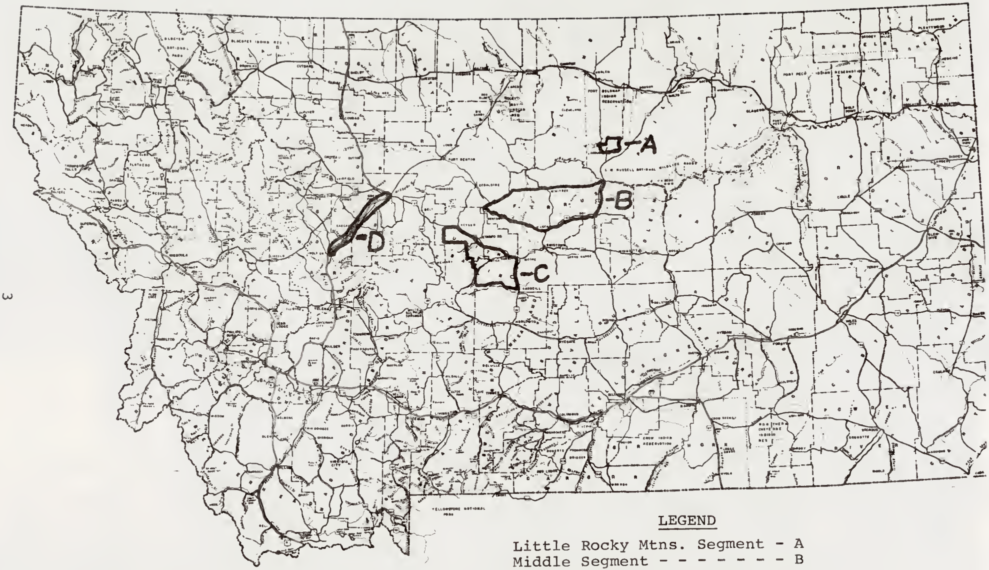
Spring Canada goose breeding population surveys were made by floating the Missouri River in a canoe. Canada goose nests were located by stopping at each island and searching the island on foot.

STUDY AREA DESCRIPTION

Location

The study area is located in central Montana (Figure 1). It is composed of several separate segments which will be designated as the Little Rocky Mountains segment, the middle segment, southern segment and the upper Missouri River segment.

The Little Rocky Mountains segment is located 75 miles northeast of Lewistown, Montana. It is approximately 50 square miles of mountains bordered on three sides by the Fort Belknap Indian Reservation (Figure 2). The middle segment is located about 10 miles north of Lewistown (Figure 3). Its southern boundary is U.S. Highway 191 and State Highway 81. The eastern boundary is U.S. Highway 191. The northern boundary follows the Knox Ridge road from the Robinson Bridge, at the Missouri River, in a westerly direction to Winifred, Montana. The boundary then continues in a westerly direction to Arrow Creek. The western boundary then follows Arrow Creek upstream in a southwesterly direction to its junction with State Highway 81. The southern segment is about 15 miles west southwest of Lewistown (Figure 4). Its eastern boundary is U.S. Highway 191. The northern boundary is U.S. Highway 87. The western boundary starts at Raynesford, Montana and follows Little Otter Creek upstream in a southerly direction to its junction with the Lewis and Clark National Forest boundary. The southern boundary follows the national forest boundary. The upper Missouri River segment consists of the Missouri River bottom from Great Falls, Montana upstream to Holter Dam (Figure 5).



LEGEND

Little Rocky Mtns. Segment - A
Middle Segment - - - - - - - - B
Southern Segment - - - - - - - C
Middle Missouri R. Segment - D

Figure 1. Study area in Montana.

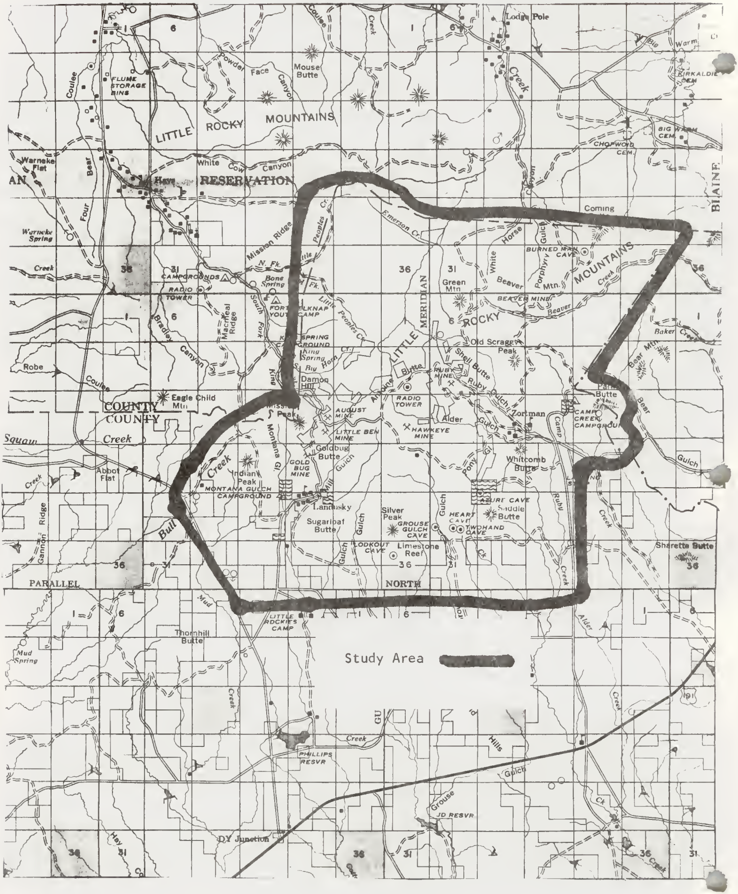


Figure 2. Little Rocky Mountains segment of study area.

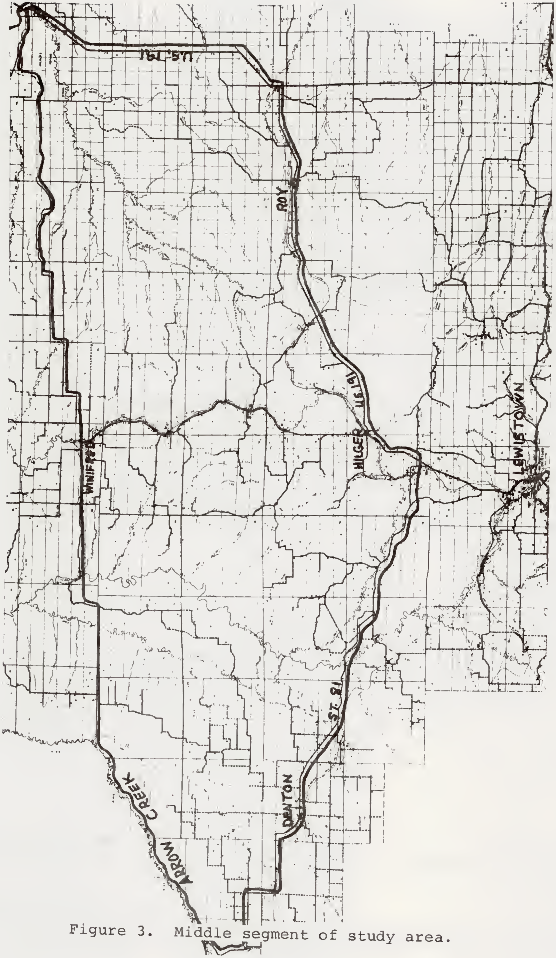


Figure 3. Middle segment of study area.

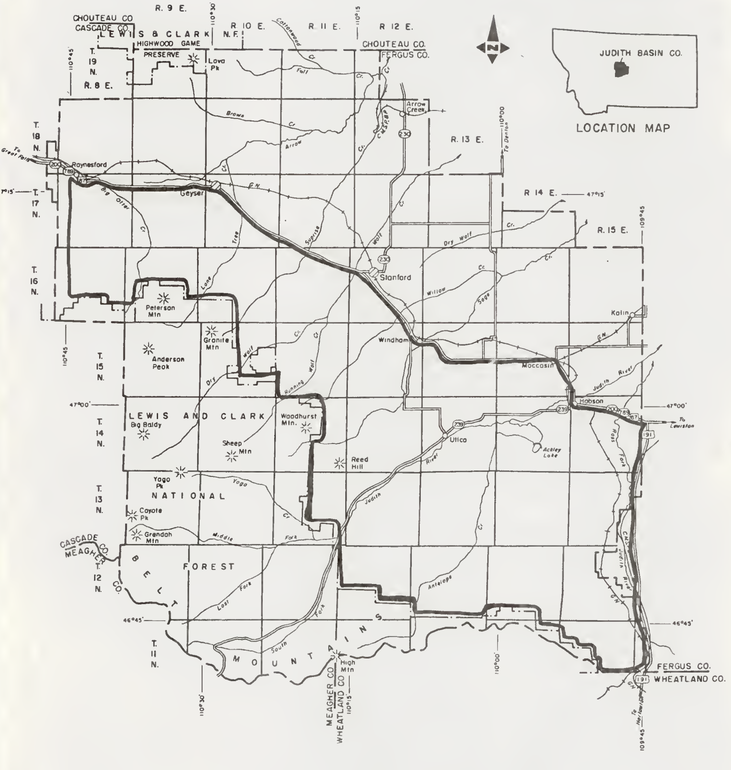


Figure 4. Southern segment of study area.

JUDITH BASIN COUNTY
MONTANA
NOVEMBER 1969
5 0 5 10 MILES
SCALE 1:500,000
TRANSVERSE MERCATOR PROJECTION
SOURCE MATERIAL: AMS TOPOGS
NL 12-2, NL 12-3, NL 12-5 AND NL 12-6

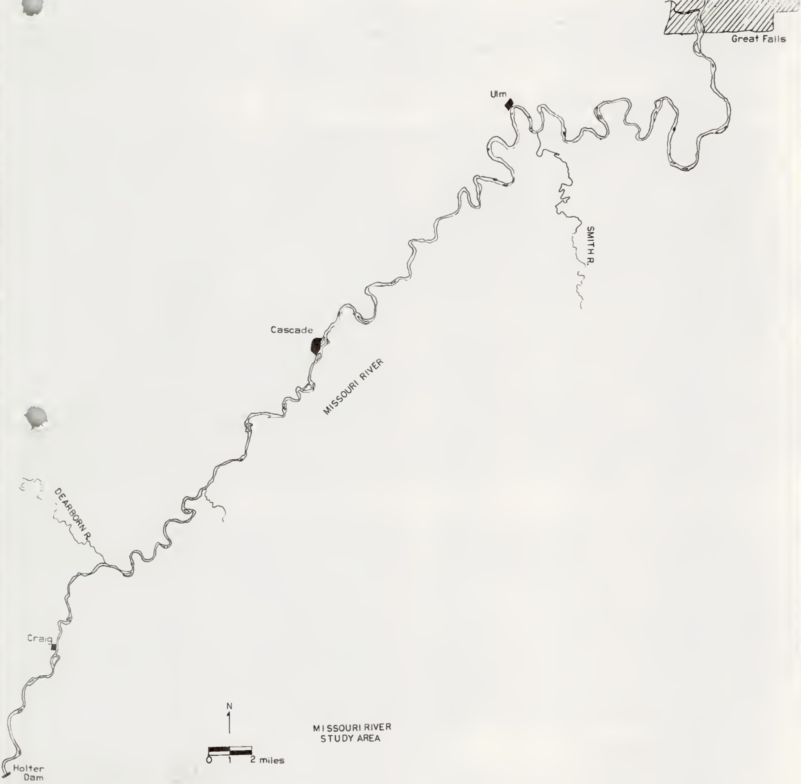


Figure 5. Missouri River segment study area (Holter Dam to Great Falls).

The study area includes parts of Phillips, Fergus, Judith Basin, Cascade and Lewis and Clark counties. The only towns of any size in or near the study area are Lewistown, Denton, Winifred, Stanford, Hobson, Geyser, Cascade and Great Falls, a city of over 60,000 population.

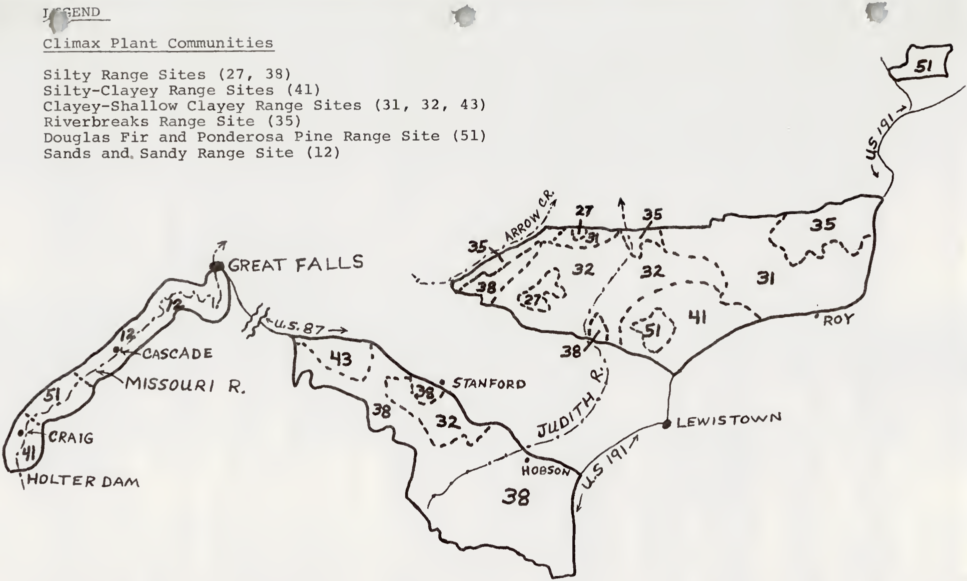
Physiography and Climate

The study area includes mountains, plains and river breaks topography. The Little Rocky Mountains are an instrusion of igneous rock forming an isolated island-like mountain mass in the plains. Altitudes range from a base of 4000 feet to a high of 5700 feet. Steep slopes are common in the mountains and streams radiate in all directions from the mountain mass. The high plains areas of the middle and southern segments of the study area, in contrast to the mountains, are lower in altitude with land surface slopes on the order of a few tens or hundreds of feet per mile. These high plains range from 3000-5000 feet in altitude and they are cut by gentle, steep-walled, low-gradient intermittent to perennial streams. The river breaks topography is confined to the northern half of the middle segment. The streams and the Judith River are all tributaries of the Missouri River and they are steep-walled and have fairly steep gradients and the upland areas are gradually being removed by headward erosion of the small intermittent tributaries to the main streams. The land becomes more intricately dissected as it nears the Missouri River. These river breaks range in elevation from 2260 to about 3000 feet (USDI 1979). The Missouri River segment consists of a riverbottom that starts in the mountains and then enters the high plains near Cascade. This segment starts at about 3500 feet in elevation and drops to about 2800 feet at Great Falls. The riverbottom doesn't meander much while it is confined to the mountains; however, after leaving the mountains the river meanders more and the river gradient decreases.

The climate of the study area is semiarid continental. It is marked by cold winters, warm to rarely hot summers, 10 to 22 inches of precipitation annually, winds primarily from the west and abundant sunshine (USDI 1979). Average annual precipitation ranges from 16 to 22 inches in the Little Rocky Mountains to 14 inches - 18 inches in the southern and middle segment. Rainfall is concentrated in the period from April through June and precipitation from July through September is characterized by localized intense thunderstorms. Snow generally falls between November and April and may be several feet deep in the mountains; on the plains, snow more than 12 inches deep is uncommon but not rare. Winter temperatures may be as low as -40 F for short periods, but the average January mean monthly temperatures are around 15 F. Summer temperatures as high as 110 F have been recorded, but the mean July temperature is about 70 F.

Soils and Vegetation

Ross and Hunter (1976) described the soils and vegetation of the study area. Their map Climax vegetation of Montana is presented in Figure 6. The following is a description of the soils associated with the climax plant communities (range sites) delineated in Figure 6:



LEGEND

Climax Plant Communities

Silty Range Sites (27, 38)
Silty-Clayey Range Sites (41)
Clayey-Shallow Clayey Range Sites (31, 32, 43)
Riverbreaks Range Site (35)
Douglas Fir and Ponderosa Pine Range Site (51)
Sands and Sandy Range Site (12)

Figure 6. Vegetation and soils map of study area.

1. Silty Range Site (nos. 27 and 38) - Soils more than 20 inches deep of very fine sandy loam, loam, or silt loam. This includes soils with 2 inches or more loam or silt loam over clayey subsoils.

2. Silty - Clayed Range Site (no. 41) - Silty soils are similar to those found in Silty Range Site. Clayed soils are granular clay loam, silty clay loam, silty clay, sandy clay or clay more than 20 inches deep.

3. Clayey - Shallow Clayey Range Site (nos. 31, 32 and 43) - Clayed soils are similar to clayed soils described in Silty-Clayed Range Site above. Shallow clayey soils are shallow granular clay soils that are 10 - 20 inches deep to underlying shale or nearly impervious clays.

4. Riverbreaks Range Site (no. 35) - Mixed soils of various depths and textures on steep irregular slopes. Trees may occur in association with shale outcroppings.

5. Douglas Fir and Ponderosa Pine Range Site (no. 51) - Deep soils that have a cryic temperature regime and brown or light brownish gray surfaces on north aspects and a frigid temperature regime and grayish brown or light brownish gray surfaces on east, south and west aspects. Terrain is steep to very steep mountains slopes. Parent materials are generally colluvium from igneous intrusive or limestone sources.

6. Sands and Sandy Range Site (no. 12) - Sand soils are sands and loamy sands more than 20 inches deep. Sandy soils are coarse to fine sandy loams more than 20 inches deep.

The distribution of existing vegetation types is similar to the climax distribution at the map scale used in this analysis. Six climax plant communities (range sites) are found in the study area and the following is a description of the vegetation of these sites:

1. Silty Range site - Nos. 27 and 38.
No. 27 - Rolling plains landform, 10-14 inches precipitation zone. This site occurs on undulating to rolling uplands, low terraces, fans and flood plains. Dominants in the climax vegetation are bluebunch wheatgrass, western and thickspike wheatgrass, needle and thread, green needle grass, basin wildrye, threadleaf sedge, prairie junegrass, native legumes, big and silver sagebrush, skunkbush sumac, common chokecherry and blue grama (species listed in order of dominance).

2. Silty - Clayey range site - No. 41
No. 41 - High plains landform, 15-19 inches P.Z. Dominants are same as site No. 38 above.

3. Clayey - Shallow Clayey range site - Nos. 31, 32 and 43
No. 31 - Rolling plains landform, 10-14 inches P.Z. This site occurs on rolling uplands, low terraces, fans, floodplains or strongly dissected uplands. Dominants are western and thickspike wheatgrasses, bluebunch wheatgrass, green needle grass, big sagebrush, prairie junegrass, plains reedgrass, prairie sandreed and milkvetches.

No. 32 - Rolling plains landform, 15-19 inches P.Z. This site occurs in the uplands on slopes from nearly level to moderately steep. Dominants are bluebunch wheatgrass, columbia and green needlegrass, idaho fescue, basin wildrye, big sagebrush, western and thickspike wheatgrasses, prairie junegrass, prairie sandreed, lupine and other native legumes, sticky geranium and prairie smoke.

No. 43 - High plains landform, 15-19 inches P.Z. Dominants are rough fescue, bluebunch wheatgrass, columbia needle grass, western and thickspike wheatgrasses, idaho fescue, basin wildrye, lupine, sticky geranium, arrowleaf balsamroot, big sagebrush, prairie smoke, prairie junegrass and death camas.

4. Riverbreaks range site - No. 35

No. 35 - Riverbreaks landform, 10-14 inches P.Z. This site is a composite of a variety of soils, topography and vegetation types. Dominants are ponderosa pine, rocky mountain juniper, Douglas fir (north slopes), bluebunch wheatgrass, western and thickspike wheatgrasses, green needle grass, prairie sandreed, basin wildrye, needle and thread, greasewood, big sagebrush, creeping juniper, native legumes and prairie junegrass.

5. Douglas Fir and Ponderosa Pine range site - No. 51

No. 51 - Mountain landform, 16-22 inches P.Z. Ponderosa pine climax forests occur on strongly sloping to very steep south and west facing slopes at elevations of 4,000-6,000 feet and east aspects to about 5,000 feet. Douglas fir forests occur above the ponderosa pine forests on east, west, and south aspects and on steep to very steep north facing slopes from about 4,000-7,000 feet. Typical overstory composition is Douglas-fir, 60 percent and ponderosa pine, 40 percent. Dominants are Douglas fir, ponderosa pine, rocky mountain juniper, pinegrass, bluebunch wheatgrass, common snowberry, idaho fescue, white spirea, elk sedge, mallow ninebark, Oregon grape, heartleaf arnica, columbia needlegrass, bearded wheatgrass, mountain brome, richardson needlegrass, twinflower, kinnikinnick, woods rose, utah honeysuckle, common juniper and lupine. In this forest complex, with a loss of the climax forest overstory, ponderosa pine can occupy the Douglas-fir climax forest sites on frigid soils. Lodgepole pine frequently occupies the Douglas-fir sites on soils with a cryic temperature regime. Rocky Mountain juniper may increase on ponderosa pine climax forest sites.

6. Sands and Sandy range site - No. 12

No. 12 - Rolling plains landform, 10-14 inches P.Z. Dominants are:

Sands:	Prairie sandreed, needle and thread, Indian ricegrass, threadleaf sedge, native legumes, yucca, and skunkbush sumac.
Sandy:	needle and thread, prairie sandreed, threadleaf sedge, bluebunch wheatgrass, western and thickspike wheatgrasses, native legumes, skunkbush sumac and blue grama.

Land Use

The Little Rocky Mountains remained primarily an Indian hunting ground with only a few white men trapping and a few others attempting to raise cattle until the discovery of gold in 1884. Miners then moved into the area as mining continued until about 1916. Another revival of mining activity started in the 1930's and ended at the start of World War II. Then, in 1978, mining began again in earnest. Throughout the early days there was livestock grazing; however, the entire study area, except for patented mining claims, is now public land administered by the Bureau of Land Management and it does not allow livestock grazing.

The land use history of the middle segment of the study area has been described extensively in past Job Progress Reports, (Constan 1979). The land use history of the southern segment is similar to the middle segment. This area was a summer resort and favorite hunting ground of several Indian tribes. The first major influx of white men arrived in the 1870's and 1880's as mining developed in the nearby mountains. Ranchers arrived shortly afterwards and soon large herds of cattle and sheep grazed the abundant grasslands adjacent to the mountains. In 1908, after the railroad arrived, the homesteaders arrived in large numbers and began to subdivide the rangelands. Farming increased rapidly and by 1977 about one-third, 287,000 acres, of the approximately 860,000 acres of rangeland was under cultivation, with 99 percent of the cultivation being dryland cropland. The southern segment remains about 89 percent private lands and 10 percent state lands.

The upper Missouri River segment of the study area has changed drastically since the Indians used it as hunting grounds. Now the large city of Great Falls occupies the north end and several other smaller towns are located along the river. Subdivisions have moved rapidly along the river and numerous homes are now found along much of the river. Farmers have farmed right to the river bank along many reaches of the river and extensive livestock grazing is practiced in the river bottom nearly everywhere else. Only the islands have retained any resemblance to what they may have been like in the days before the white man arrived.

FINDINGS - SOUTHERN SEGMENT

Mule Deer and White-Tailed Deer

Primary emphasis was placed upon delineating mule deer winter range; however, since the two winters surveyed were very mild, it was impossible to delineate winter ranges. Consultation with Robert Varner, Judith Game Range manager, Montana Department of Fish, Wildlife & Parks (MDFWP), provided information on numerous past surveys of wintering deer and an attempt to delineate winter ranges in the southern segment was made (Figure 7).

Elk

Varner's information was used again to determine that elk use on the study area is primarily restricted to two areas. During the 1980-81 winter, Varner observed 239 elk wintering in the Tepee Butte-Reed Hill area and another 144 elk wintering just outside the national forest boundary between Little Otter Creek and Dry Wolf Creek. The Tepee Butte-Reed Hill area is also a primary elk calving ground.

Antelope

Mild winters also prevented antelope winter range delineation; however, a summer survey of antelope (Figure 8) was made and two primary concentration areas were found. These were the Skull Butte-Cayuse Basin and Waite Creek areas. There is a significant amount of state land located in these two antelope concentration areas. These state lands should be classified as excellent wildlife habitat with emphasis on preventing breaking up the native grassland.

Upland Game Birds

The southern segment has small populations of sharp-tailed grouse, Hungarian partridge and pheasants. The primary pheasant habitat is found along the Judith River and the Ross Fork of the Judith River. Riparian habitat throughout the southern segment should be preserved, as it is critical to the survival of pheasants, sharp-tails and white-tailed deer.

Waterfowl

Waterfowl are found associated with most stockponds and reservoirs in the area and along the larger streams. Waterfowl nest and raise broods on most of these bodies of water and Ackley Lake and Red Shed Lake produce numerous duck broods.

The southern segment study area was originally selected because two coal exploration drilling programs were proposed for the area. It appears, from the limited information available, that the drilling programs found

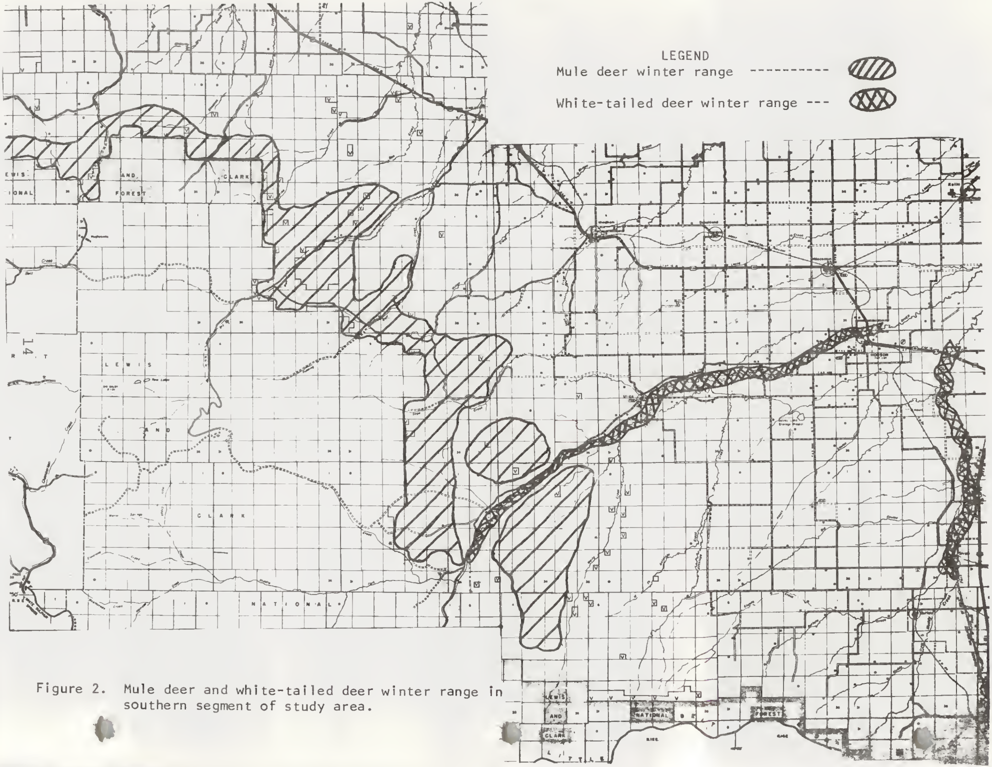

LEGEND
Mule deer winter range ----------
White-tailed deer winter range ---
LEWIS
AND
CLARK
NATIONAL
FOREST
HOBSON
Utica
Stanford

Figure 2. Mule deer and white-tailed deer winter range in southern segment of study area.

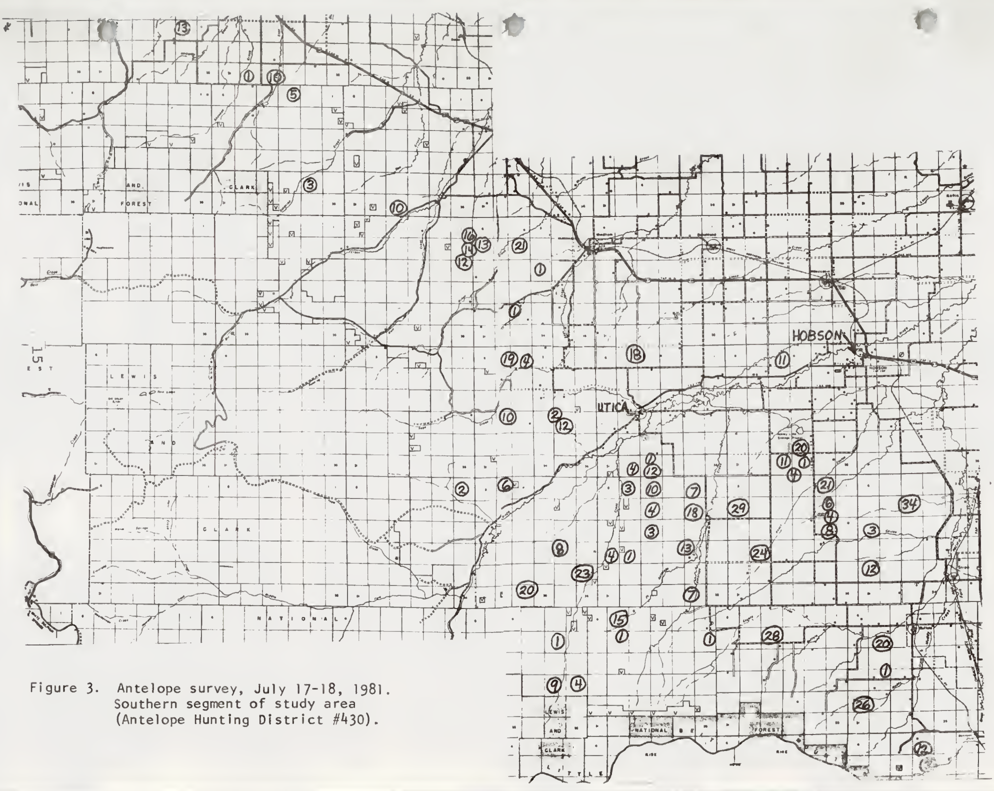


Figure 3. Antelope survey, July 17-18, 1981.
Southern segment of study area
(Antelope Hunting District #430).

little to warrant further drilling or development. After evaluating the study data, it seems that further drilling or limited development would not create major problems for wildlife if drilling and/or development avoided riparian habitat and deer and elk winter ranges. Drilling could proceed on winter ranges during the period when the deer and elk aren't using them. An area of extreme value to wildlife is the Reed Hill-Tepee Butte area. It is major elk and deer winter range and a major elk calving site. State land section 36, T14N, R11E is part of Reed Hill and it should be primarily managed for wildlife.

As with most areas in Montana, livestock overgrazing is present. This practice is detrimental to wildlife, especially when it is associated with riparian habitat. The practice of placing livestock feedlots in riparian habitat is also very destructive to riparian habitat and water quality. Management of private lands is not contestable; however, public land management agencies should prevent livestock overgrazing on public lands.

FINDINGS - MIDDLE SEGMENT

Mule Deer and White-tailed Deer

The middle segment is an excellent big game area. It contains significant populations of mule and white-tailed deer.

During the 1979-80 and 1980-81 winters, 660 and 734 mule deer were classified, respectively. Fawns per adult ratios were 80 and 75 fawns per 100 adults in 1979-80 and 1980-81, respectively. Both of these ratios are very significantly higher than the previous three years' ratios. These higher ratios are also reflected in the greater numbers of mule deer that are now observed throughout the area.

Because of the two mild winters, no winter ranges were delineated since deer remained scattered throughout the wintering periods.

The following is a list of primary mule deer and white-tailed deer areas with the public lands that are important to and associated with these areas:

Arrow Creek breaks - all BLM lands
Coffee Creek breaks - all BLM lands
Judith River breaks - all BLM lands and State Sec. 36, T21N, R16E
Dry Wolf Creek " - all BLM lands
North Moccasin Mts - all BLM lands (majority of the mountains is BLM)
Fargo Coulee breaks - all BLM lands
Sourdough Creek " - all BLM lands
Armells Creek breaks and bottom - all BLM lands and all lands on
C. M. Russell National Wildlife Refuge
Dog Creek bottom - no public lands
Deer Creek bottom- no public lands
Boxelder Creek bottom - no publid lands

The major threat to deer in the middle segment area is changing land use practices. As in many areas, there is a gradual and continuous destruction of native sagebrush-grassland in this area so that farmers and ranchers can plant grains and/or hay. Since nearly all of the remaining sagebrush and timber is on public lands, it is very important that it is not destroyed on these lands. The value of sagebrush to numerous wildlife species is well documented. The timber associated with these lands provides important cover for wildlife and it also has very little value as commercial timber.

Another important threat to deer is livestock overgrazing, especially in riparian habitat. The practice of placing livestock feedlots in riparian habitat is very detrimental to this habitat and the associated wildlife.

Antelope

Numerous antelope are found throughout the non-breaks portion of the middle segment. Surveys determined that antelope are well scattered in the area and remained scattered during the two mild winters; consequently, no areas of winter concentration were delineated.

As with deer, the land use practice and trend of sagebrush-grassland destruction is the primary land use practice that detrimentally affects antelope. To counteract this practice, there should be no sagebrush destruction on public lands throughout the middle segment study area. The majority of the remaining sagebrush is on public lands which makes these lands more critical to antelope.

The same can be said of sage grouse and sagebrush, as they are inseparable. The public land management agencies must be leaders in the protection of the remaining sagebrush-grassland wildlife habitat.

Livestock overgrazing of the sagebrush-grassland is also a major detrimental practice for antelope.

Upland Game Birds

Sharp-tailed Grouse and Sage Grouse

Most work, on the upland game portion of the study, was concentrated upon locating sharp-tailed grouse and sage grouse breeding grounds. A total of 55 previously unknown sharptail grounds (Table 1 and Figure 9) and 9 sage grouse grounds (Table 2 and Figure 9) were located during the study. All new grounds were found by flying. Low-level flying is an excellent technique for locating grouse grounds.

The following is a list of public lands that have grouse breeding grounds:

Sharp-tailed grouse

State Land:	Sec 36, T20N, R15E; Sec 16, T19N, R18E; Sec 20 and 21, T19N, R20E; S 34,T19N, R21E
BLM land:	Sec 20, T19N, R23E

Table 1. Maximum numbers of male sharp-tailed grouse observed on newly found dancing grounds, middle segment of study area, 1979-1981 springs.

Ground Designation and Location[1]		Year 1979	1980	1981	1982
West of Judith River					
A 1	NW¼ S12, T18N, R15E			22[2]	
A 2	N½S27, T18N, R14E	21	22	16	23
A 3	S½S18, " "	15	14	12	14
A 4	NW¼S5, " R15E			14	9
A 5	W½S13, T20N, R14E			9	
A 6	NW¼S25, " "			8	
A 7	SE¼S25, " "			3	
A 8	Center of S36, T20N, R14E			21	
A 9	NE¼S 5, T19N, R15E			4	0
A 10	SW¼S34, " "		19	18	8
A 11	SE¼S15, T19N, "			7	4
A 12	SE¼S11, " "			9	7
A 13	NW¼S18, " R16E			18	14
A 14	SE¼S 1, " R15E			10	11
A 15	NE¼S36, T20N "			10	9
A 16	SW¼S3, T19N, R16E			24	
A 17	SW¼S26, T20N, "			10	
A 18	SE¼S14, " "			10	
A 19	NE¼S31, " R17E			9	
A 20	SW¼S1, T19N, R16E			22	
A 21	NE¼S26, T20N, R15E				37
A 22	NW¼S36, T20N, R15E				8
Judith River east to St. Highway 236					
B 1	SW¼S34, T18N, R16E		8	0*	
B 2	SW¼S 9, " "		6	0*	
B 3	N½S30, " R17E		28	14	
B 4	SE¼S7, " "		15	8	
B 5	NE¼S17, T18N, R17E			21	
B 6	SW¼S 4, " "		32	13	
B 7	S32, T19N, R17E		13	1	
B 8	S19, " "		27	0*	
B 9	S28, " "		2	0	
B 10	E½S35, " "		10	7	
B 11	E½S27, " "		26	8	
B 12	NE¼S27, T20N, R17E			2	
B 13	SE¼S12, " "			14	
B 14	NW¼S23, " R18E		23	19	
B 15	NE¼S27, " "			26	
B 16	SE¼S16, T19N, "		18	NC[3]	
B 17	SE¼S29, " "		17	15	

Table 1 continued.

Ground Designation and Location	Year 1979	 1980	 1981
B 18 NE¼S5, T18N, R18E		15	12
B 19 NE¼S36, T19N, "		16	17
B 20 NW¼S1, T18N, "			20
B 21 SW¼S3, " "			9
B 22 SW¼S10, " "			17
B 23 E½S14, " "			14
B 24 S3, T17N, R18E		1	35
State Highway 236 east to Armells Creek			
C 1 NE¼S18, T18N, R19E			29
C 2 NW¼S2, " "			9
C 3 NW¼S26, T19N, "			5
C 4 SW¼S25, " "			15
C 5 SE¼S20, " R20E			17
C 6 NE¼S21, " "			20
C 7 SE¼S27, T20N, R19E			4
Armells Creek east to US Highway 191			
D 1 S34, T19N, R21E		6	NC
D 2 SE¼S13, T20N, R21E			4
D 3 S8, " R23E		27	NC
D 4 SW¼S20, " "		12	

1 - See Figure 9 for plotted locations.
2 - Underlined in year ground was first found and counted.
* - Surveyed too late in morning; probably missed birds.
3 - NC = Not Counted

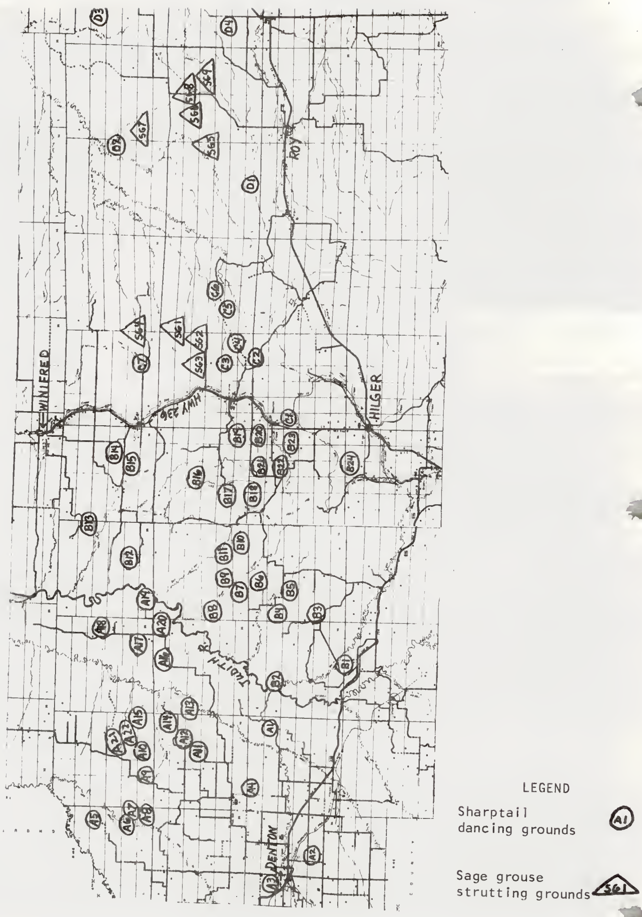


Figure 9. Sharp-tailed grouse and sage grouse breeding grounds. Middle segment of study area.

Table 2. Maximum numbers of male sage grouse observed on newly discovered strutting grounds, spring 1981.

Ground Designation and Location[1/]	Year 1981
SG 1 NW¼S7, T19N, R20E	2*
SG 2 NW¼S13, " R19E	10
SG 3 NW¼S14 " "	2*
SG 4 SE¼S25, T20N, "	19
SG 5 SE¼S13, T19N, R21E	5
SG 6 SE¼S8, " R22E	36
SG 7 NE¼S30, T20N, "	3*
SG 8 NE¼S 9, T19N, "	12
SG 9 NW¼S14, " "	22

1 - See Figure 9 for plotted locations.
* - Needs further inventory to make sure it is a permanent ground.

Sage grouse
BLM land: Sec 14, T19N, R19E; Sec 21, T20N, R19E; Sec 21, T20N, R19E; Sec 21, T20N, R22E; Sec 30, T20N, R22E

State Lands and the BLM should orient their management to protect these grouse grounds. Any destruction of sagebrush-grassland or riparian habitat on state or BLM lands would be detrimental to upland game birds as well as other species of wildlife. This destruction can be caused by plowing or overgrazing or chemical spraying. During the 1982 spring, the local Wildlife Division biologist requested and funded a survey of several previously known sharp-tailed grouse dancing grounds on and adjacent to the middle segment of the study area (Tables 1 and 3).

Table 3. Maximum numbers of male sharp-tailed grouse observed on breeding grounds, springs 1976-1981.

Ground Designation and Location		Year						
		1976	1977	1978	1979	1980	1981	1982
A	SE¼S16, T20N, R15E	30[1]	NC[2]	42	49	29	11	13
B	SW¼S18 " R16E	16	NC	NC	NC	27	6	9
C	SW¼S16 " R16E	14	NC	14	17	14	9	9
D	SE¼S 7 " "	16	NC	12	16	34	14[3]	6
F	SE¼S34 T22N, R15E	18	NC	5	14	27	19	19
G	NE¼S33, " "	10	NC	0	8	19	14	14
H	NW¼S33 " "	31	NC	NC	2	30	12	21
I	NW¼S18, " R16E	12	NC	NC	0	7	0	NC
J	NE¼S9, " R17E	24	22	NC	17	15	NC[4]	
K	NE¼S6, T21N, R18E		13	NC	13	0	10	
L	SW¼S27, T22N, "		3	NC	6	NC	0	
N	NE¼S2, T21N, R17E		18	15	8	7	8	
P	NE¼S33, T22N, R17E		18	11	13	3	5	
R	NE¼S7, " "		3	NC	1	0	NC	
S	SW¼S15, T21N, R18E		18	15	7	14	14	
V	SE¼S3, T20N, R15E			19	18	8	7	0
W	SE¼S12, T22N, R16E			28	6	0	7	
X	NE¼S21, T21N, R15E			8	11	20	20	22
Y	SW¼S14, " "			5	10	16	12	14
Z	SW¼S18, " R16E			3	3	1	0	NC
CC	SW¼S30, T21N, R18E				22	19	25	
DD	SE¼S16, T22N, R17E				11	5	2	
EE	SW¼S 8, T21N, R16E				15	20	12	12
FF	SW¼S21, T20N, R18E				14	16	13	
GG	SW¼S6, T21N, R16E				11	19	13	12
HH	SW¼S36, T22N, R15E					17	12	4

1 - Underlined in year ground first found and counted.
2 - Not counted.
3 - Ground plowed up in spring 1980 before census.
4 - Ground moved east 150 yards.

Hungarian Partridge

Few Huns were observed, as their population levels have remained low since being devastated by the severe winters of 1977-78 and 1978-79.

Pheasants

An excellent ring-necked pheasant population resides in the middle segment. It is primarily associated with riparian habitat on permanent or intermediate watercourses.

A 17-stop spring crowing count route was run along Dog Creek in May 1980 and 1981. An average of 10.5 calls per stop was recorded in 1980 and 13.4/stop in 1981 - an increase of 23%.

Pheasant winter sex ratios during the 1979-80 and 1980-81 winters were 1.75 females per male and 1.14 females per male, respectively.

All public lands containing this riparian habitat are important to pheasants and other wildlife. All brush removal practices are detrimental to these wildlife populations, and should be discouraged and avoided.

Waterfowl

Most of the reservoirs and stockponds in the middle segment provide nesting and/or brood rearing habitat for ducks and several of the larger reservoirs provide both Canada goose and duck habitat. The Judith River is a major source of Canada goose and duck production. It is recommended that any suitable stockponds or reservoirs on public lands be made more attractive for waterfowl nesting and brood rearing. This can be accomplished by constructing islands on suitable bodies of water. State lands and BLM lands that contain potentially suitable ponds and reservoirs should be managed so that waterfowl receive a top priority.

Public land management agencies can also enhance waterfowl habitat by preventing livestock overgrazing of vegetation in and around stockponds and reservoirs.

FINDINGS - LITTLE ROCKY MOUNTAINS SEGMENT

Bighorn Sheep

The primary species studied was bighorn sheep. Few mule deer and no elk or white-tailed deer were observed during the study period. The bighorn herd varied from 32 to 45 during the study period. Observations during this period indicated that most of the bighorns' yearlong home range is identical to their winter range. This winter range was delineated and is shown in Figure 10.

The large gold mining operations, located 1½-2 miles north of the primary bighorn winter/yearlong range, are still functioning. The actual mining and processing sites appear to have little conflict with the bighorns; however, these mining operations are causing several indirect conflicts. The influx of a large number of mining people and their dogs are increasing harassment of the sheep. A pack of domestic dogs was observed on the bighorn

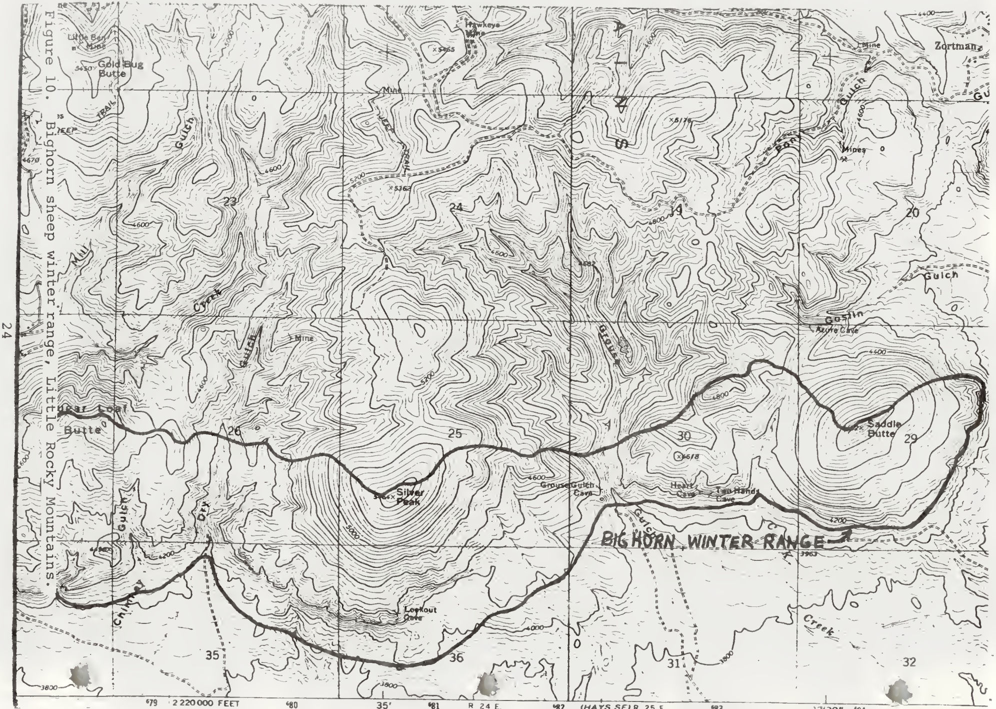


Figure 10. Bighorn sheep winter range, Little Rocky Mountains.

winter range feeding on a deer. Whether the dogs killed the deer or not is purely speculative; however, it has been documented throughout the country that domestic dog packs will harass and kill big game.

The greatest threat that this sheep herd may face is the possibility that mining exploration and development may increase upon its range. At least one road has already been built across the sheep range. Activity related to mining on the bighorns' winter range/yearlong range will have serious detrimental effects on the bighorns.

The bighorn winter and yearlong range is entirely public lands administered by the Bureau of Land Management. It is recommended that the BLM manage these lands in a manner which will not be detrimental to the bighorn herd. This would include the continuation of no livestock grazing in this area and maximum supervision of any mining on the critical primary winter bighorn range.

Other Wildlife

Though little data were gathered on other wildlife species, some general comments can be made. The two large mining operations have both direct and indirect detrimental effects on these wildlife species. Directly, these mining operations are destroying habitat and displacing and disturbing wildlife. Indirectly, the large influx of people related to mining in the area will increase the disturbance to wildlife. There will probably be an increase in poaching and domestic dog harassment of all wildlife.

FINDINGS - MIDDLE MISSOURI RIVER SEGMENT

CANADA GEESE

Breeding Season

During the springs of 1980 and 1981, Canada goose nest and production surveys were conducted on the Missouri River. In 1980, the river was surveyed from Holter Dam to Great Falls, Montana. The 1981 survey covered the river from Hardy to Great Falls. The upper reach was not inventoried in 1981 due to the low number of nests located in 1980.

The first recorded nest in 1980 was located on March 27, at which time it was in the second week of incubation. The last active nest, which was located on May 22, was also half way through incubation. By back dating and estimating hatching dates, the 1980 nesting season extended from March 1 through June 5, or 97 days. A majority of the nests located were initiated about the first of April, with a peak of hatch during the first week of May.

During the 1981 season, nest surveys were begun on April 15, when nests were actively being incubated with full clutches. Nest initiation, as determined through back dating, was placed at approximately the first week of April. The latest active nest was located on May 13, and was approximately two weeks into incubation. The latest hatching date would then be around May 27. As in 1980, the peak of nest initiation was during the first week of April, with a corresponding peak of hatch during the first week of May.

Breeding population surveys were conducted from the ground during the nest surveys in 1980 and 1981. Data from these surveys are presented in Table 4. For the river from Hardy to Great Falls, a total population of 197 and 207 geese was found for 1980 and 1981, respectively. These figures show an active breeding population (pairs and singles) of 89 birds in 1980, or 43% of the total population, and 114 birds, or 58% of the 1981 total.

Figures 11 and 12 present the distribution of nest sites for 1980 and 1981. A total of 53 nests was located in 1980 and 56 nests in 1981 (Table 5). During both years, a majority of the nesting effort occurred on the river segment between Hardy and Ulm, 41 nests or 77% in 1980 and 46 nests or 82% in 1981.

Data on nest fate are presented in Table 6. The fate of 42 nests (79%) was determined in 1980. Hatching success (one or more eggs hatched) was 85.7% in 1980. Due to heavy rains and subsequent flooding in late May 1981, nest fate was determined for only 10 of 56 nests. However, the vast majority of nests hatched prior to flooding and known fate nest success (80%) was felt to be a reasonable estimate of nest success for 1981. This high nest success was comparable to that found on the Middle Missouri River study from Morony Dam to Robinson Bridge, which averaged 85% success from 1977 to 1979.

In 1980, desertion, at 12%, was the greatest cause of nest loss, with destruction due to predation resulting in only 2.3% nest loss. The 1981 figures on desertion and destruction are felt to be biased, due to the small sample size. Field experience and impressions indicate these figures should be similar to the 1980 data.

Egg success (Table 7) was derived from known fate nests. The 1980 egg success rate was 83%, compared to 74.5% in 1981. Egg fertility was 94% in 1980 and 93% in 1981.

The frequency distribution of clutch sizes is presented in Table 8. The average clutch size was 6.0 eggs in both 1980 and 1981. The majority of nests, 83% in 1980 and 74% in 1981, had clutches of 5-7 eggs. Clutch size ranged from 3 to 12 eggs.

In 1980, known fate successful nests (36) produced 195 young for an average of 5.4 young per nest. Production for the 11 nests of undetermined fate was calculated by using the average clutch size of 6, egg fertility at 94%, and nest success at 85.7%, to give an estimated production of 53 young.

Table 4. Canada goose breeding population survey, 1980 and 1981.

Section	Pairs	Singles	Groups	Total
Hardy to				
1980	21	0	61	103
1981	29	0	11	69
Cascade to				
1980	17	1	48	83
1981	20	0	43	83
Ulm to				
1980	4	4	9	21
1981	8	0	29	45
Great Falls				
Total				
1980	42	5	118	207
1981	57	0	83	197

Table 5. Canada goose nest surveys 1980 and 1981.

	No. Nests	
River Section	1980	1981
Holter Dam		
to	1	-*
Craig		
to	4	-*
Hardy		
to	20	26
Cascade		
to	21	20
Ulm		
to	7	10
Great Falls		
Total	53	56

*Not surveyed.

Table 6. Canada goose nest fate.

Fate	1980		1981		Known Fate %	
	No. Nests	%	No. Nests	%	No. Nests	%
Hatched	36	68	8	14	85.7	80.0
Deserted	5	9	0	0	11.9	0
Destroyed	1	2	2	4	2.3	20.0
Subtotal	42		10			
Undetermined	11	21	46	82		
Total	53		56			

Table 7. Canada goose egg success (known fate nests).

Fate	1980		1981	
	No.	%	No.	%
Hatched	195	83.0	41	74.5
Deserted	18	7.7	0	0
Destroyed	3	1.3	11	20.0
Infertile	15	6.4	2	3.6
Dead Embryo	4	1.7	1	1.8
Total	235		55	

Table 8. Frequency distribution clutch size.

Clutch Size	1980		1981	
	No.	%	No.	%
3	4	8.5	4	7.1
4	1	2.1	4	7.1
5	12	25.5	10	17.9
6	13	27.7	19	33.9
7	14	29.8	15	26.8
8	1	2.1	1	1.8
9	1	2.1	2	3.6
10	1	2.1		
11				
12			1	1.8
Total	47		56	

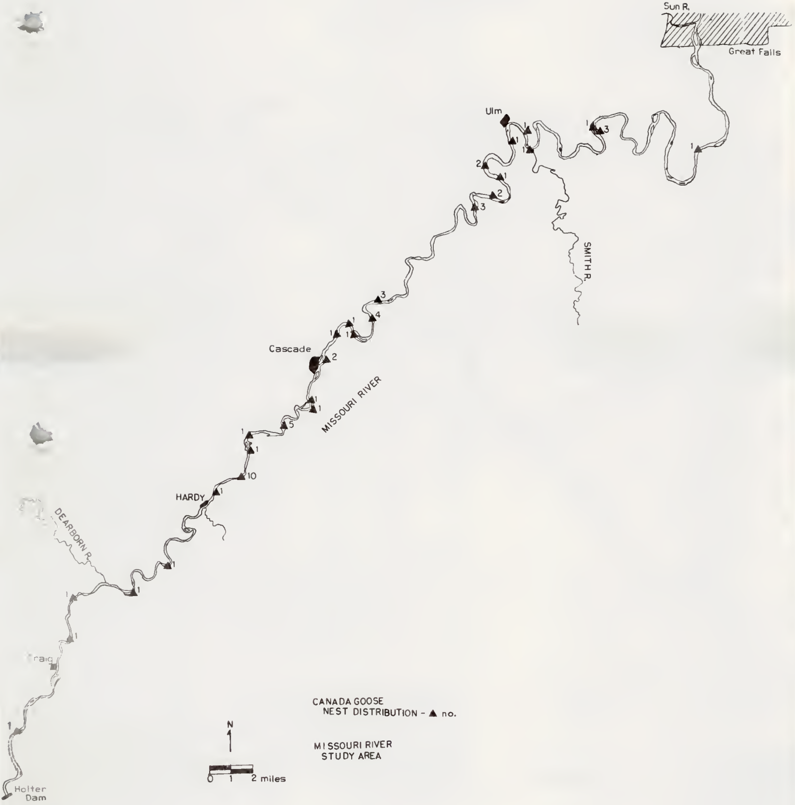


Figure 11. Canada goose nest distribution, 1980.

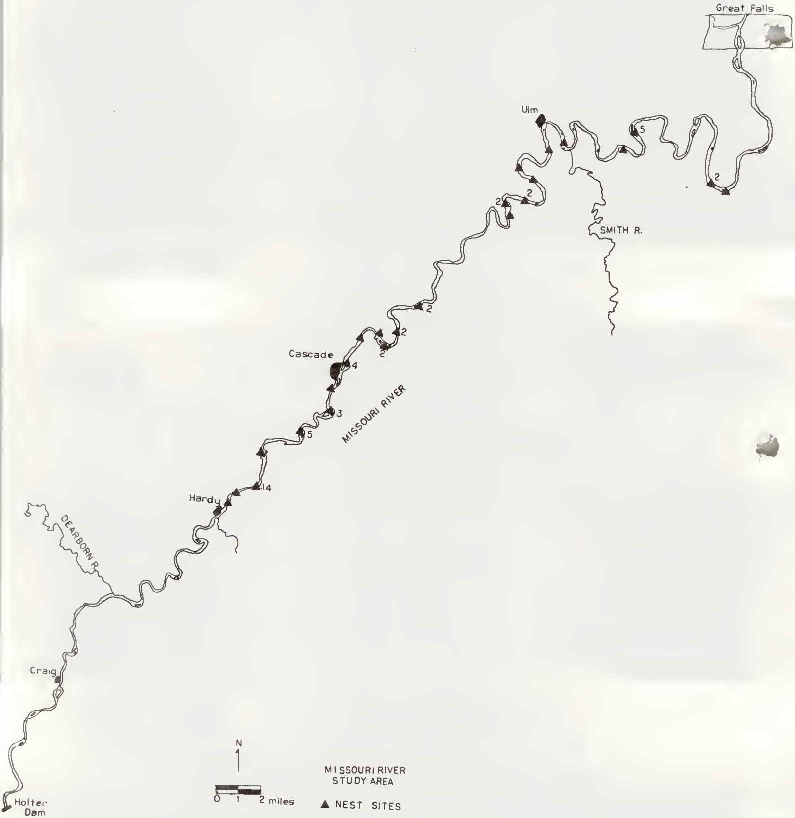


Figure 12. Canada goose nest sites, 1981.

These figures would indicate a total production of 248 young Canada geese in 1980. This would give a productivity of 2.8 young per river mile over the 90-mile reach from Holter Dam to Great Falls, and compares to an average production of 3.8 young per mile for the 1977 through 1979 seasons on the Missouri River from Carter Ferry to Robinson Bridge. Production figures for 1981 were not calculated, due to the smaller percentage of known fate nests. However, production should have been similar,or greater than 1980 based on similar nest success rates and an actual increase in the number of nests located.

Data on nest site vegetation and nest material are presented in Table 9. Litter was the predominant nest material, with 86.5% and 92.9% of the nests composed of litter in 1980 and 1981, respectively. Willow was the preferred nest site vegetation, with 67.3% of the nests in 1980 and 62.5% of the nests in 1981 found in this cover type.

Table 10 presents data on nest site vegetation height, distance of nest sites to water, and height of nest sites above water. In 1980, 50% of the nests were located in vegetation less than 3 feet in height, compared to 42.9% in 1981. A majority of the nests were within 25 feet of open water (65% in 1980 and 66% in 1981). The percentage of nest sites less than 4 feet above the river level at the time of survey was 50% in 1980 and 58.9% in 1981.

Table 9. Nest vegetation and nest material.

Nest Site Vegetation	1980 No.	1980 %	1981 No.	1981 %
Willow	35	67.3	35	62.5
Grass	6	11.5	3	5.4
Rosa spp.	3	5.7	4	7.1
Dogwood	1	1.9	0	0
Broadleaf forbs	4	7.7	8	14.3
Litter	3	5.7	6	10.7
Total	52		56	

Nest Material	1980 No.	1980 %	1981 No.	1981 %
Litter	45	86.5	52	92.9
Driftwood	5	9.6	-	-
Dogwood	2	3.8	1	1.7
Grass	-		2	3.6
Cattail	-		1	1.7
Total	52		56	

Table 10. Nest site vegetation height, distance to water, and height above water.

Vegetation Height	1980		1981	
	No.	%	No.	%
0-1	7	13.5	10	17.9
1-2	13	25.0	9	16.1
2-3	6	11.5	5	8.9
3-4	10	19.2	6	10.7
4-5	2	3.8	3	5.4
5-6	1	1.9	3	5.4
6-7	1	1.9	17	30.4
7-8	0	0	0	0
8-9	2	3.8	0	0
9-10	0	0	1	1.8
10+	10	19.2	2	3.6

Distance to Water	1980		1981	
	No.	%	No.	%
0-5	14	26.9	6	10.7
6-10	7	13.5	13	23.2
11-25	13	25.0	18	32.1
26-50	11	21.2	10	17.9
51-75	3	5.8	5	8.9
76-100	2	3.8	2	3.6
100+	2	3.8	2	3.6

Height above Water	1980		1981	
	No.	%	No.	%
0-1	0	0	0	0
1-2	4	7.7	8	14.3
2-3	10	19.2	18	32.1
3-4	12	23.1	7	12.5
4-5	5	9.6	9	16.1
5-6	5	9.6	7	12.5
6-7	10	19.2	3	5.4
7-8	3	5.8	0	0
8-9	0	0	0	0
9-10	0	0	0	0
10+	3	5.8	4	7.1

In both 1980 and 1981, all the Canada goose nests were located on islands. Table 11 gives a breakdown of number of islands, number of nests, and percent of islands used as nest sites by river section. The Hardy to Ulm sections contained the majority of nests located - 78.9% in 1980 and 82.1% in 1981. This river segment contained 52% of the islands present. The percentage of islands used as nest sites varied from 16.6% in 1980 for the Craig to Hardy reach to 61.9% in 1981 for the Cascade to Ulm reach. The overall island use was 32% in 1980 and 35% in 1981.

Table 11. No. of Canada goose nests and percent of islands used per river section.

River Section	No. Islands	%	No. Nests	%	Islands Used No.	%
Craig to						
1980	24	24.0	4	7.7	4	16.6
1981	-	-	Not surveyed			
Hardy to						
1980	31	31.0	20	38.5	11	35.4
1981	-	-	26	46.4	15	42.9
Cascade to						
1980	21	21.0	21	40.4	12	57.5
1981	-	-	20	35.7	13	37.1
Ulm to						
1980	24	24.0	7	13.5	5	20.8
1981	-	-	10	17.9	7	20.0
Great Falls						
Total	100		1980 52		32	
			1981 56		35	

Information on the number of nests and islands per river mile is presented in Table 12. The average number of islands per mile was 1.2, with a range of 0.8 to 2.4. The average number of nests per mile was 0.6 in 1980 and 0.7 in 1981. In comparing the Hardy to Cascade and Ulm to Great Falls sections, it can be seen that the first section had three times as many islands per river mile and 6.7 times as many nests per river mile as the latter section.

Data on multiple nesting on islands are presented in Table 13. Islands with a single nest accounted for 67.6% of all islands used as nest sites and 41.1% of all nests. As in 1980, approximately 60% of the nests were located on islands with more than one nest. The area of greatest nest concentration and multiple nesting occurs in an abandoned gravel dredging operation below Hardy. Fourteen nests were located in this area on four islands.

Table 12. Canada goose nests and islands per river mile.

River Section	Miles	Islands/Mile	Nests/Mile 1980	Nests/Mile 1981
Craig to Hardy	14.4	1.7	0.2	Not surveyed
Hardy to Cascade	12.7	2.4	1.6	2.0
Cascade to Ulm	24.5	0.9	0.9	0.8
Ulm to Great Falls	29.8	0.8	0.2	0.3
Total	81.4	Ave. 1.2	Ave. 0.6	0.7

Table 13. Number of islands and nests by frequency of nests/island.

No. of Nests per Island	No./% Islands 1980		No./% Islands 1981		No./% Nests 1980		No./% Nests 1981	
1	21	65.6	23	67.6	21	40.4	23	41.1
2	6	18.8	7	20.6	12	23.1	14	25.0
3	3	9.4	1	2.9	9	17.3	3	5.4
4	1	3.0	1	2.9	1	7.7	4	7.1
5	0	0	0	0	-	-	-	-
6	1	3.0	2	5.8	6	11.5	12	21.4
Total	32		34		52		56	

In summary, the Missouri River between Holter Dam and Great Falls appears to be a significant and successful Canada goose production area in Montana. With 86% nest success in 1980, this area produced approximately 250 goslings. A majority of the nesting effort occurred between Hardy and Ulm. The reach of river from Holter Dam to Hardy would appear to be high quality Canada goose nesting habitat, with available and preferred gravel bar-willow type islands. However, in 1980 only five nests were located in this reach. At this time, one possible explanation for this unexpected lack of nesting effort may be human disturbance. This reach of river has a rather extensive bank development of summer homes and recreation areas and represents one of the best and most highly utilized trout fisheries in the state. Intensive human activity was noted during spring 1980 in a nest survey from Holter Dam to Craig, a distance of 8 miles. Forty-two fishermen on shore and in five boats were encountered during this mid-week survey in late March when nest initiation was occurring. In this particular reach, every island experienced human activity. This degree of human activity may be one factor in reducing nesting effort in this reach. In the Ulm to Great Falls reach, a majority of the nesting effort occurs in the upper few miles. The lower part of this reach contains fewer islands and islands sufficiently large to preclude nesting activity.

Other Birds

The islands on the Missouri River also provide excellent habitat for pheasants, ducks and numerous other species of waterfowl and nongame birds. This habitat depends on maintaining the integrity of these islands. Once the islands are lost, this habitat will deteriorate.

Great blue herons were found throughout the entire reach from Holter Dam to Great Falls. Two active rookeries were located in 1980. One rookery at Sec 4, T19N, R2E had 24 nest structures. A second rookery at Sec 11, T19N, R2E had 18 nest structures.

Several osprey were observed in the upper reaches of the study area during spring 1980. One active nest which produced young in 1980 was located at the mouth of Little Prickly Pear Creek.

Other Mammals

These islands also provide excellent habitat for deer, numerous species of nongame animals and furbearers. Maintaining the integrity of these islands is a major key to maintaining good habitat for the above-mentioned mammals.

Instream Flow Requirements

During the course of the Canada goose nesting study, an effort was made to determine the instream flow requirements to maintain the security of nest site islands. Three islands were selected in the Hardy to Ulm reach of the river for this analysis (Figure 13). Instream flow analysis was conducted during the summer and fall of 1980 using a modified WETP technique as described by Fred Nelson (MDFWP). These islands were selected on the priority basis of: active Canada goose nest, how representative they were of "typical" nesting habitat, and finally on physical requirements of the WETP program.

The WETP technique was modified for use on side channels in the following manner: Benchmarks were established on each side channel and headstakes placed on each side of the side channel cross-section. Cross-sections were selected based on physical and biological requirements. Water elevations were recorded under various flow conditions and side channels gaged at high, intermediate and low flows. These side channel flow readings were then correlated to total river discharge at the nearest USGS gage station. Side channel profiles were surveyed under low flow conditions and the above data submitted for computer analysis.

The computer-generated data were then used to construct a curve for each island side channel cross-section of wetted perimeter versus side channel discharge. From these curves (see graphs), inflection points were determined and side channel flow at these points recorded. A curve was then prepared for each side channel using gaged side channel flows versus total river flows from USGS gage stations. The inflection point side channel flow was then applied to this curve to determine the total Missouri River discharge which would represent the minimum flow for each side channel.

Maintaining adequate side channel flows is necessary to ensure protection from mammalian predators for Canada goose nests. Under extreme low flows, predators have easy access to the islands and can significantly reduce goose production. The security of the islands is a primary factor in their selection as nest sites by Canada geese. This security is provided by adequate side channel flows which are a function of depth, width and velocity. It is for this reason that wetted perimeter was selected for use. Since it is a function of both depth and width, its relationship to discharge is believed to give the best indicator of minimum flows needed to maintain secure nest sites.

Table 14 presents the results of the three cross-sections analyzed in this segment of the Missouri River. The side channel flows shown are the result of the WETP curves (see Figs. 14-19) and the total river discharge figures are taken from the curves correlating side channel flow to USGS gage station data. These results indicate that a flow of approximately 3500 cfs as recorded at the Holter Dam USGS gage station is required to maintain secure nesting habitat in this section of the Missouri River.

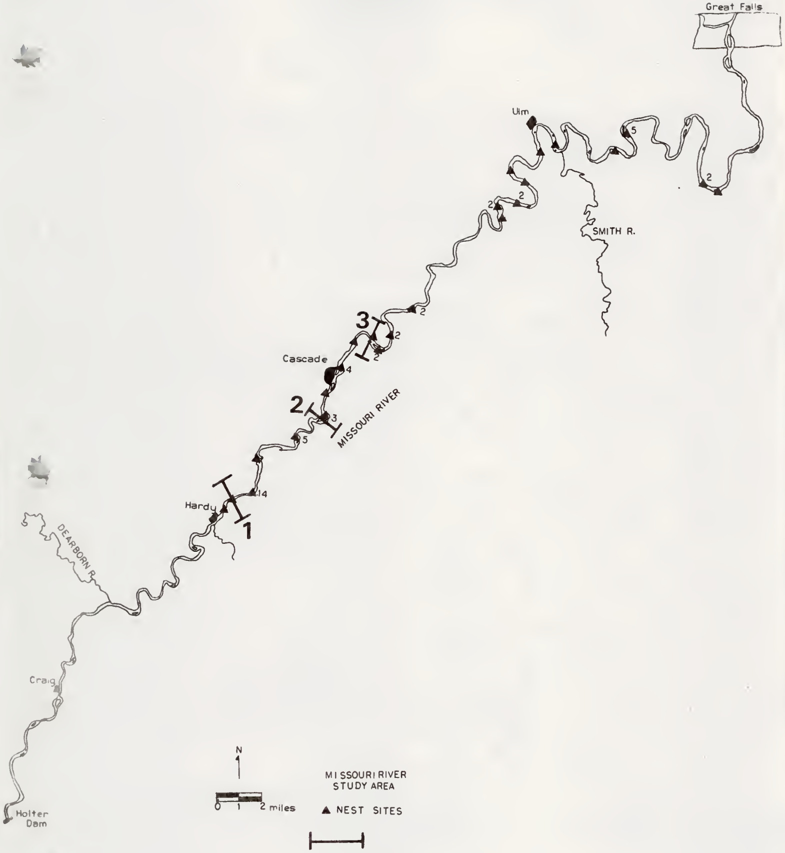


Figure 13. Side channel cross-section.

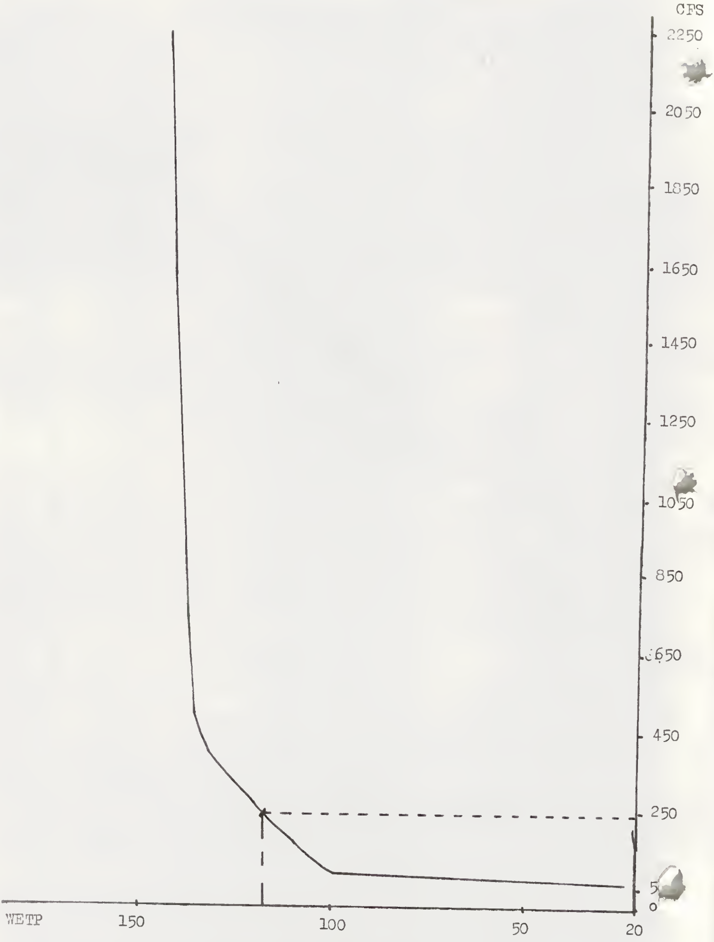


Figure 14. Wetted perimeter vs. side channel discharge.
Missouri River cross section L.

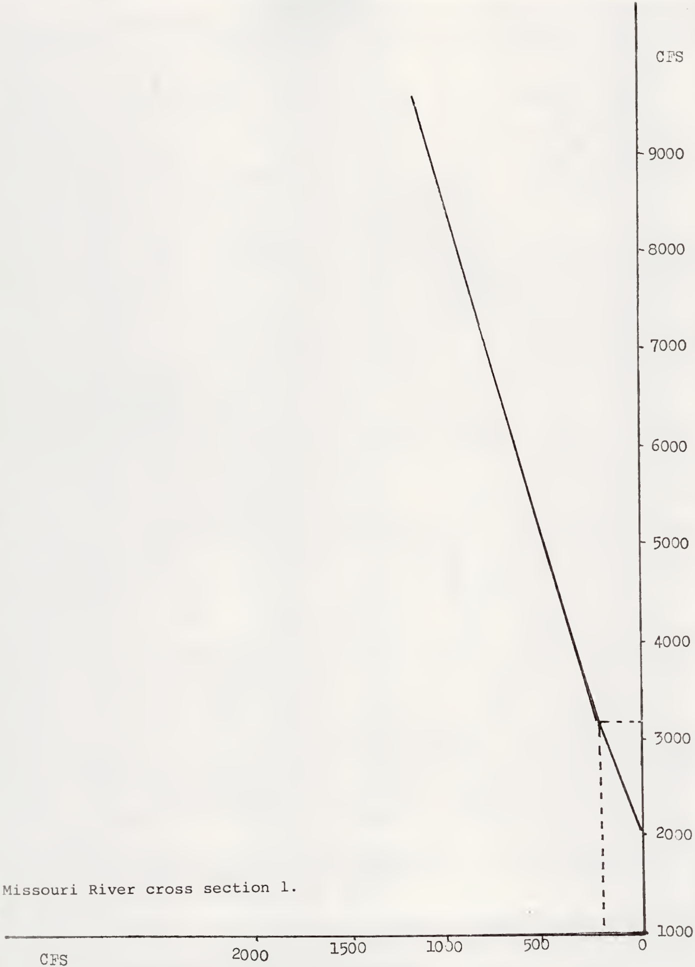


Figure 15. Side channel vs. total discharge.

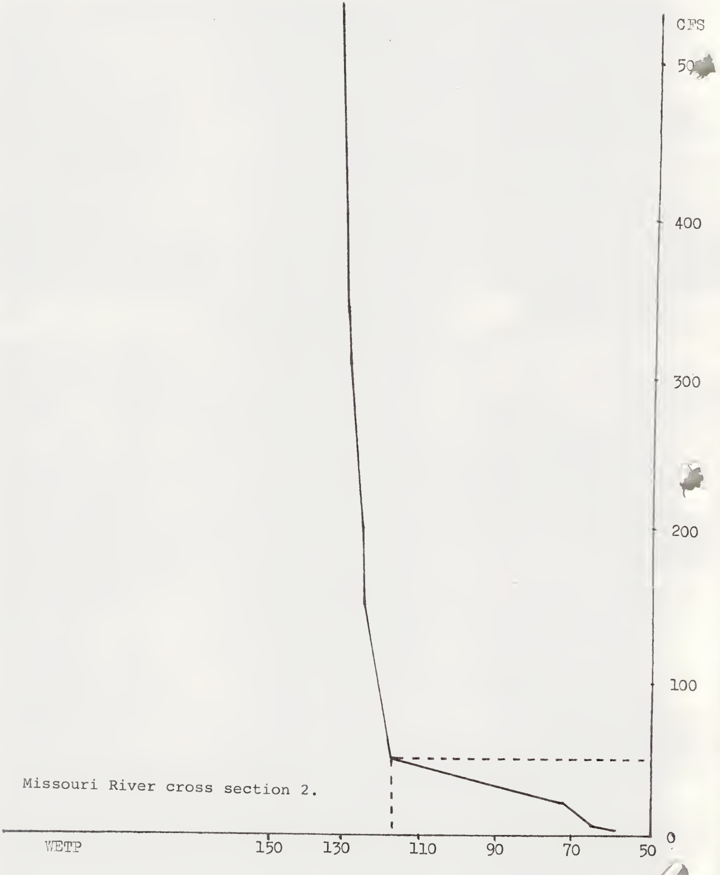


Figure 16. WETP vs. side channel discharge.

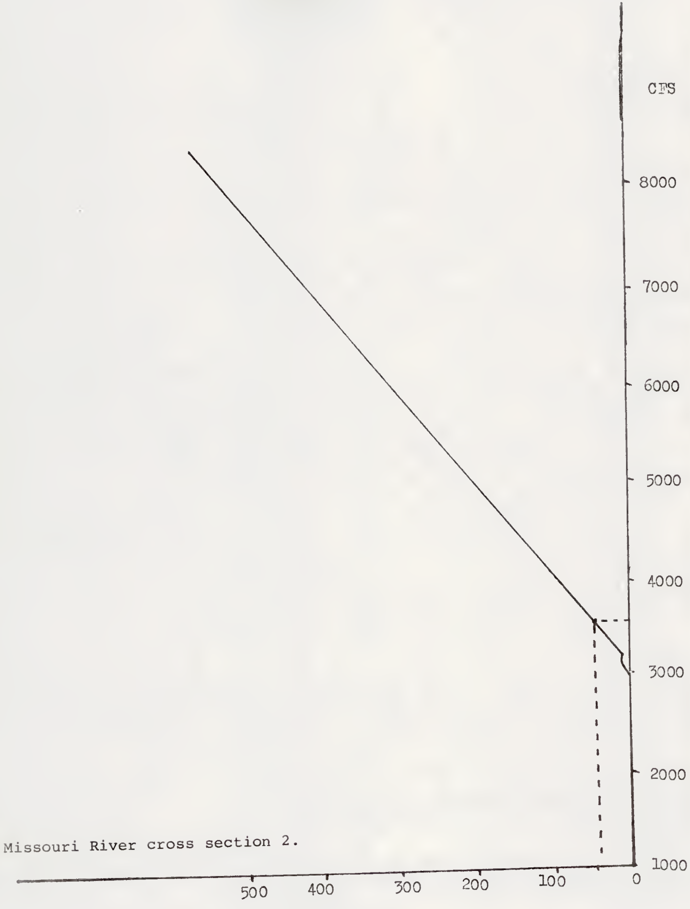


Figure 17. Side channel vs. total discharge.

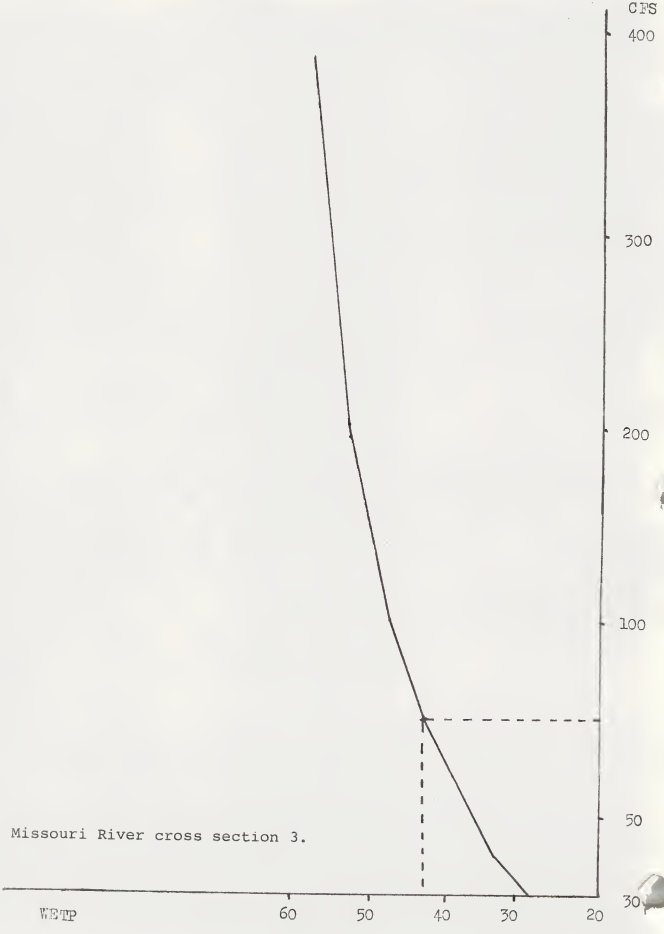


Figure 18. WETP vs. side channel discharge.

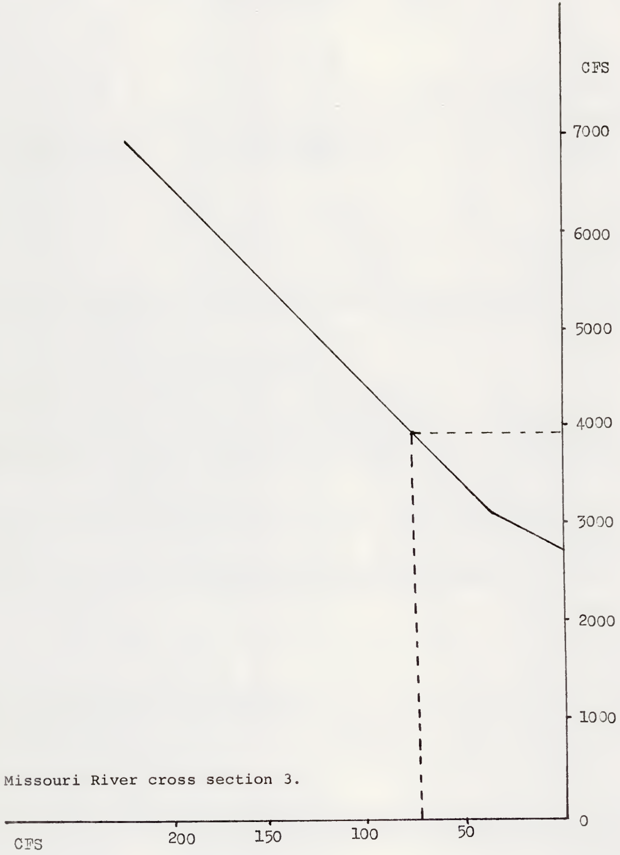


Figure 19. Side channel vs. total discharge.

Table 14. Minimum flow requirements.

Cross Section	Side Channel Flow	Total River Discharge
L	225	3150
2	50	3600
3	75	3900
Average		3550 cfs

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